



Various Intratesticular Hypoechoic Lesions on Scrotal Sonography

초음파에서 보이는 다양한 고환 내 저음영 병변

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Sonography with a high-frequency transducer is the modality of choice for imaging the scrotum. Most intratesticular lesions are hypoechoic. Differentiation of intratesticular hypoechoic lesions as either malignant or benign is important because the treatment of these lesions vary. In this paper, we review the sonographic features of different types of intratesticular hypoechoic lesions, such as testicular cysts, testicular tumors, testicular inflammatory lesions, segmental testicular infarction, and testicular trauma.

Index terms Scrotum; Testis; Ultrasonography; Doppler, Color

INTRODUCTION

Gray scale sonography in combination with color Doppler imaging is a usually the initial imaging modality for the evaluation of pathologic conditions of the scrotum. The principal role of a sonographic examination of the scrotum is to help distinguish intratesticular from extratesticular lesions. The majority of extratesticular masses are benign. In contrast intratesticular masses are more likely to be malignant (1).

Although most intratesticular lesions are malignant, benign intratesticular masses have been reported (2). Differentiation between malignant and benign lesions is important because the treatment of these two disease entities is different.

Most intratesticular lesions are seen as hypoechoic lesions on sonography. Although there is substantial overlap of sonographic findings in various intratesticular lesions, some sonographic features, along with clinical characteristics, may suggest a specific diagnosis. Sonography may provide important information regarding lesion location, size, echogenicity, shape, multiplicity, and the presence of calcification or blood flow within the lesion. Familiarity with the sonographic features of various intratesticular lesions

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facilitates accurate diagnosis and treatment.

In this article, we review the relevant literature and discuss the sonographic features of different types of intratesticular hypoechoic lesions, namely, testicular cysts, testicular tumors, testicular inflammatory lesions, segmental testicular infarction and testicular trauma.

EVALUATION OF TESTICULAR LESIONS

All patients were examined by a standard testicular sonographic technique using a 5-MHz to 12-MHz transducer. The testis and epididymis were examined in the transverse and longitudinal planes. Color Doppler sonography was performed using optimized color Doppler parameters. The operator varied the power level, threshold, persistence and wall filter to maximize the detection of blood flow throughout the field of view. The speed scale of the color Doppler setting was put at the lowest detectable flow speed. The operator adjusted color gain control to minimize or alleviate the background color noise.

Sonographic findings were determined by a retrospective analysis of the images. The gray scale and color Doppler sonographic images were interpreted by the consensus of two experienced radiologists, each with more than ten years of sonography experience.

The radiologists determined the echogenicity of the lesion, the shape of the margin of the lesion, multiplicity, the presence of calcification, and the degree of blood flow of within the lesion. The echogenicity of the lesions was classified into homogeneous or heterogeneous. The margins of the lesions were classified as smooth, irregular, and ill-defined. The echogenicity of the lesions was compared with the ipsilateral testis. The degree of blood flow was determined by comparing with the contralateral asymptomatic side. Vascularity was graded using a three-point scale: - (no visible blood flow), + (a few signals in the lesion), and ++ (marked signals in the lesion) (Table 1).

TESTICULAR CYSTS

Testicular cysts are relatively common and Gooding et al. (3) reported it occurred in 9.8% of male. Testicular cysts include simple testicular cysts, cysts of the tunica albuginea, tubular ectasia of the rete testis, and epidermoid cysts. On sonography, testicular cysts are diagnosed based on their classic appearance. Careful analysis should be performed to identify any solid foci within the cysts. If solid focus is seen in the cysts, there is a possibility of testicular tumors, such as nonseminomatous germ cell tumors and cystic teratoma (4).

SIMPLE CYST

Simple cysts are found incidentally and range from 2 mm and 20 mm in diameter. Simple cysts are frequently solitary, but can be occur in multiple. Simple testicular cysts have the typical appearance of other cysts and may be described as well-defined anechoic structures with increased through transmission (Fig. 1) (5).

TUNICA ALBUGINEA CYST

The etiology of tunica albuginea cysts is not known but is believed to be mesothelial in ori-

Table 1. Sonographic Findings of Multiple Intratesticular Lesions

Lesions	Sonographic Findings				
	Echogenicity	Margin	Color Doppler	Calcification	Multiplicity
Simple cyst	Homogeneous	Smooth	-	-	+
Tunica albuginea cyst	Homogeneous	Smooth	-	+	+
Tubular ectasia of rete testis	Heterogeneous	Irregular	-	-	+
Epidermoid cyst	Heterogeneous	Irregular	-	+	-
Seminomatous GCT	Homogeneous or heterogeneous	Smooth	++	-	+
Non-seminomatous GCT	Heterogeneous	Irregular	++	+	+
Leydig cell tumor	Homogeneous	Smooth	++	-	-
Lymphoma/leukemia	Homogeneous	Smooth	++	-	+
Pyogenic orchitis	Heterogeneous	Ill-defined	++	-	-
Abscess	Heterogeneous	Irregular	-	-	+
Mumps orchitis	Homogeneous	Ill-defined	++	-	-
Tuberculosis	Heterogeneous	Irregular	-, +	+	+
Segmental testicular infarction	Heterogeneous	Irregular	-	-	-
Hematoma	Homogeneous	Smooth	-	-	-
Testicular rupture	Heterogeneous	Irregular	-, +	-	-

GCT = germ cell tumor

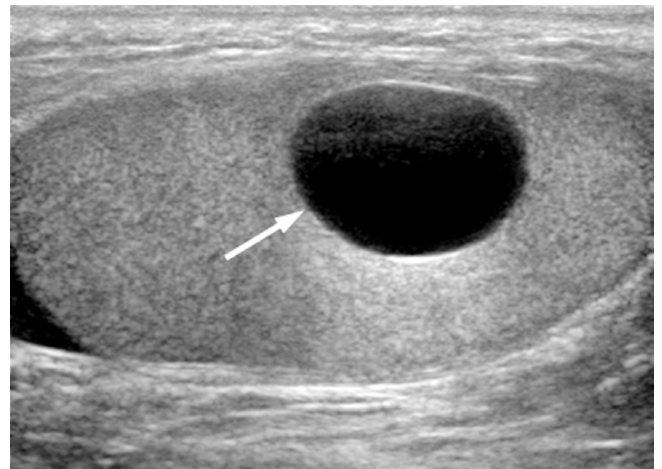


Fig. 1. Intratesticular cyst in a 55-year-old male. Longitudinal sonography shows a well-defined cystic mass in the testis (arrow).

gin (5). The size of the cysts ranges from 2 mm to 5 mm. These cysts commonly present as palpable masses and may show calcification. Tunica albuginea cysts are usually solitary, but can be occur in multiple. The sonographic findings of the tunica albuginea cysts are simple anechoic cysts with posterior enhancement (Fig. 2) (6).

TUBULAR ECTASIA OF THE RETE TESTIS

Tubular ectasia of the rete testis is a benign condition and is caused by partial or complete obliteration of the efferent ducts. These findings may be associated with a spermatocele.

On sonography, tubular ectasia of the rete testis is seen as a hypoechoic branching cystic



Fig. 2. Tunica albuginea cyst in a 50-year-old male. Longitudinal sonography shows a well-defined cystic mass in the anterior and lower portion of the testis (arrow).

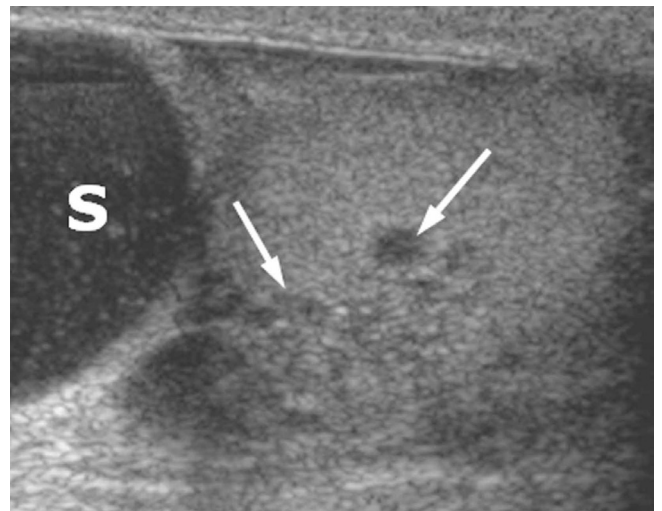


Fig. 3. Tubular ectasia of the rete testis in a 58-year-old male. Longitudinal sonography shows multiple variable sized cystic lesions in the posterolateral region of the testis (arrows). An associated spermatocele (S) is seen in the head of the epididymis.

configuration in the mediastinum testis (Fig. 3) (5, 7, 8).

EPIDERMOID CYSTS

Epidermoid cysts are uncommon benign tumors that are germ cell in origin. The pathogenesis is uncertain but is thought to represent mesodermal development of a teratoma or squamous metaplasia of the seminiferous epithelium or rete testis (9). The sonographic findings of epidermoid cysts depend on the compactness and quantity of keratin within the cysts (5). The classic appearance of the epidermoid cyst on sonography is an onion-ring pattern with alternating hyperechoic and hypoechoic layers (Fig. 4). However, it may also be seen as having a target appearance, or a sharply defined mass with a rim of calcification or solid mass with an echogenic rim (7, 10). Blood flow is not usually detected within the cyst on color Doppler sonography.

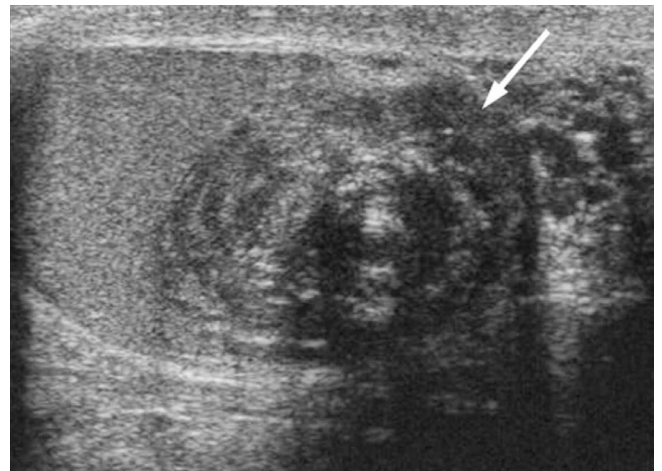
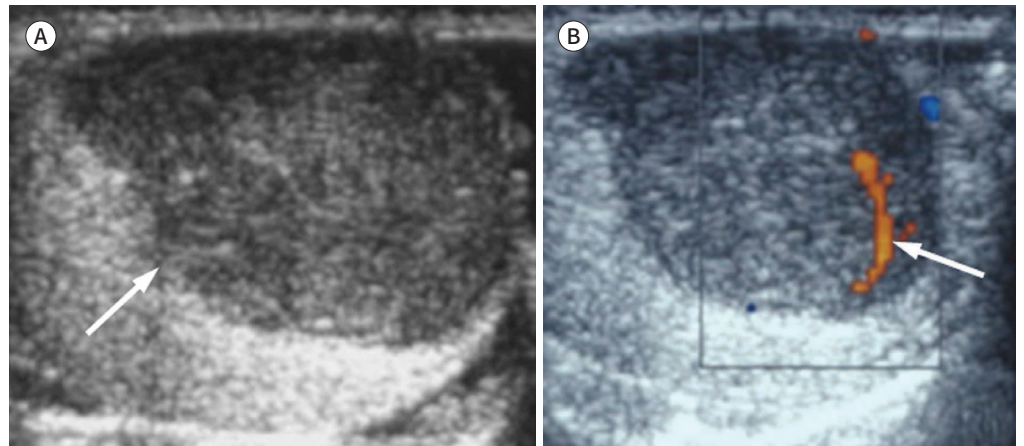


Fig. 4. Epidermoid cyst in a 25-year-old male. Longitudinal sonography shows a well-circumscribed mixed hypoechoic and hyperechoic mass with onion ring configuration in the testis (arrow).

Fig. 5. Seminoma in a 54-year-old male.

A. Longitudinal gray scale sonography shows a well-defined hypoechoic mass in the testis (arrow).

B. On color Doppler sonography, blood flow is seen in the mass (arrow).



TESTICULAR TUMORS

Malignant testicular tumors account for only 1% of all malignancies in men but they are the most common malignancy in men among 15–34 years old (4). Germ cell tumors account for 90%–95% of testicular tumors (4). Other malignant testicular tumors include sex cord-stromal tumors, lymphoma, leukemia and metastases. Germ cell tumors are divided into seminomatous and nonseminomatous germ cell tumors. Sex cord-stromal tumors account for 4% of all testicular tumors (4). They are usually small and can be divided into Leydig cell tumors and Sertoli cell tumors. Although most intratesticular masses are more likely to be malignant, there are variety of benign intratesticular lesions, such as orchitis, abscess, infarction, granuloma and hematoma, which may mimic testicular malignancies.

SEMINOMATOUS TUMORS

Seminomas are the most common testicular tumors and accounting for approximately 50% of germ cell tumors. Most seminomas are hypoechoic masses with homogeneous echotex-

tures with increased vascularity (Fig. 5) (7). Rarely, a seminoma may replace the testicular parenchyma, resulting a heterogeneous echotexture on sonography (Fig. 6) (8). Seminoma may present heterogeneously when necrosis or cysts are found within the tumor (11).

NONSEMINOMATOUS TUMORS

Nonseminomatous malignant germ cell tumors of the testis have multiple histologic patterns, such as embryonal carcinoma (Fig. 7), yolk sac tumor (Fig. 8), choriocarcinoma (Fig. 9), and teratoma (Fig. 10). Yolk sac tumors occur most often in children younger than 5 years of age and produce α -fetoprotein (4). Choriocarcinomas occur most commonly between the ages of 10 and 30 years of age, are composed of both cytotrophoblasts and syncytiotrophoblasts, and produce human chorionic gonadotrophic hormone (7). They usually have irregular or poorly

Fig. 6. Seminoma in a 32-year-old male.

- A.** Longitudinal gray scale sonography shows a multiple hypochoic masses in the testis.
- B.** On color Doppler sonography, the masses are hypervascular.

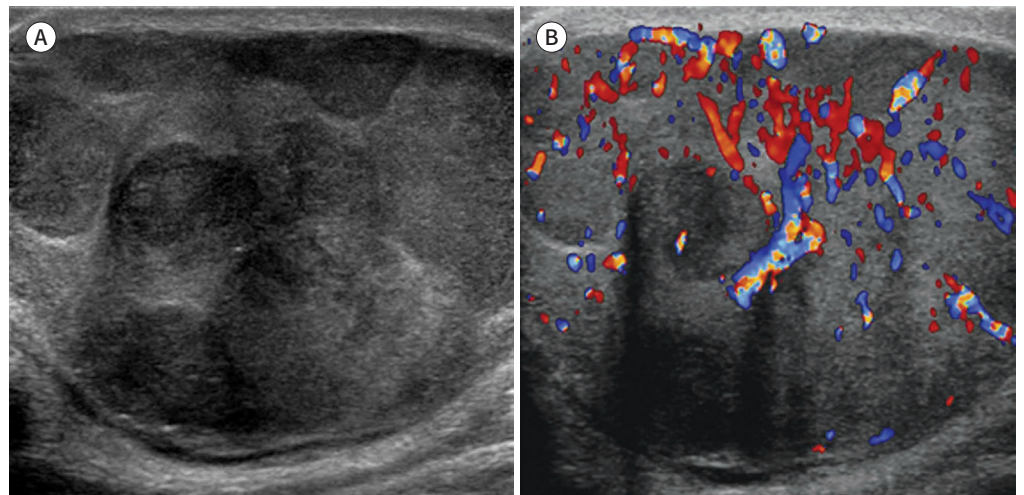
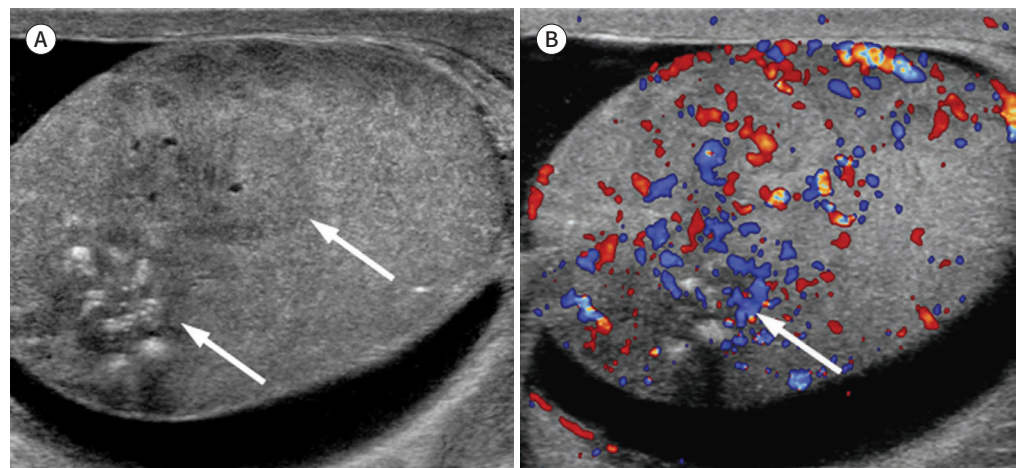


Fig. 7. Embryonal carcinoma in a 30-year-old male.

- A.** Longitudinal gray scale sonography shows an ill-defined, heterogeneously hypochoic masses (arrows) with internal calcifications in the testis.
- B.** On color Doppler sonography, the masses are hypervascular (arrow).



defined margins and a heterogeneous echo texture due to the presence of hemorrhage and necrosis (9, 12). Teratomas commonly have cystic components and echogenic foci indicating calcification, cartilage, immature bone and fibrosis (7). In children, mature teratomas are be-

Fig. 8. Yolk sac tumor in a 3-year-old child.

- A.** Longitudinal sonography shows a homogeneously hypoechoic mass (arrows) in the testis.
- B.** On color Doppler sonography, the masses are hypervascular.

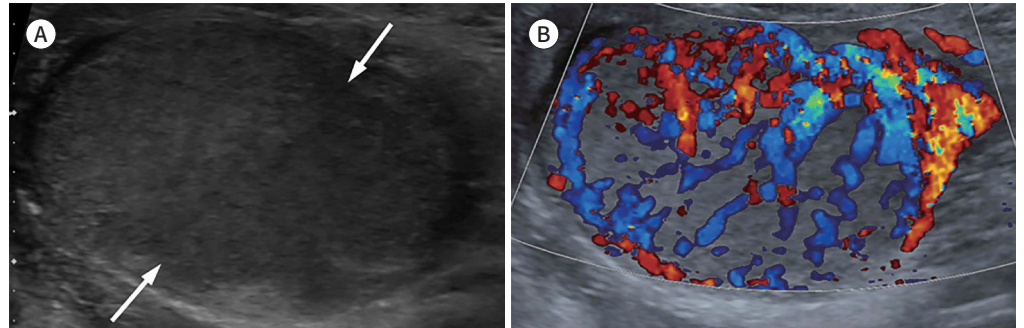


Fig. 9. Mixed germ cell tumor (embryonal carcinoma and choriocarcinoma) in a 9-year-old child.

- A.** Longitudinal gray-scale sonography shows a well-defined, hypoechoic mass (arrows) in the testis.
- B.** On color Doppler sonography, the mass is hypervascular (arrow).

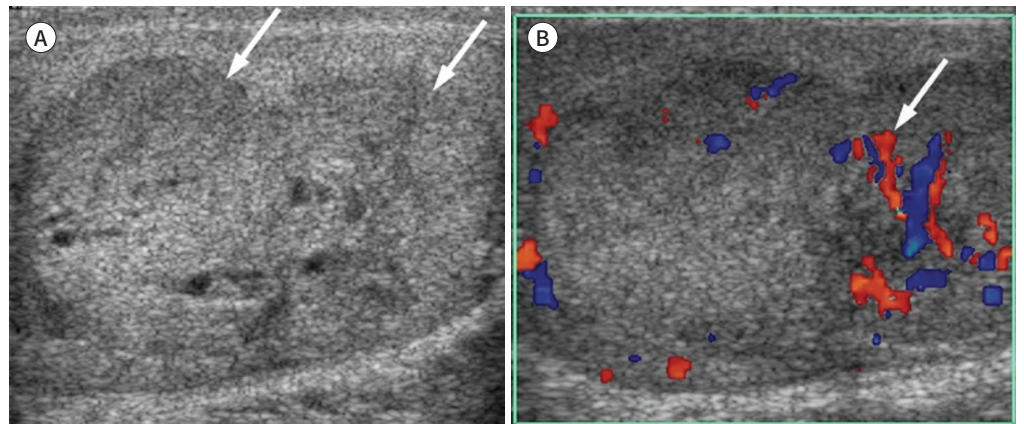
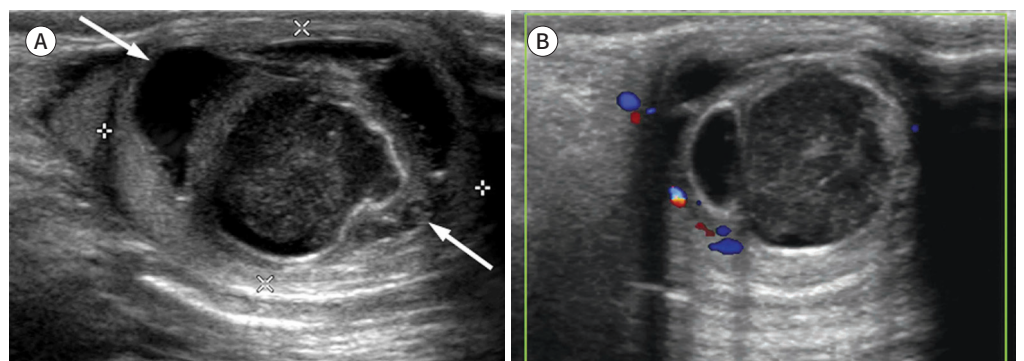


Fig. 10. Teratoma in a 1-year-old infant.

- A.** Longitudinal gray scale sonography shows multiple cystic masses with internal echoes (arrows) in the testis.
- B.** On color Doppler sonography, blood flow is not seen within the mass.



nign. However, teratomas in adults should be treated as malignant tumor (7).

SEX CORD-STROMAL TUMORS

Sex cord-stromal tumors constitute 4% of all testicular tumors and arise from the sex cord (Sertoli cells) and interstitial stroma (Leydig cells) (4). Leydig cell tumors are the most common type of sex cord-stromal tumor of the testis. They are associated with various hormonal manifestations, such as gynecomastia and precocious puberty due to the production of androgens or estrogens (4). Most Leydig cell tumors are usually revealed as a well-circumscribed, homogeneously hypoechoic mass on sonography (Fig. 11). Moreover, increased peripheral blood flow is seen on color Doppler sonography (13). Sertoli cell tumors are less common testicular tumors. They showed well-defined, round to lobulating masses or calcifying masses on sonography (4, 7). Other sex cord-stromal tumors include granulosa cell tumors, fibroma-tercomas, and mixed sex cord-stromal tumors.

LYMPHOMA AND LEUKEMIA

Lymphoma is the most common testicular tumor in men older than 60 years and accounts for 50% of cases. Primary leukemia of the testis is rare but the testis is commonly the site of extramedullary relapse after chemotherapy-induced remission (8). Leukemia or malignant lym-

Fig. 11. Leydig cell tumor in a 62-year-old male.

A. Longitudinal gray scale sonography shows a well-defined, hypoechoic mass (arrow) in the testis.
B. On color Doppler sonography, the mass is hypervascular (arrow).

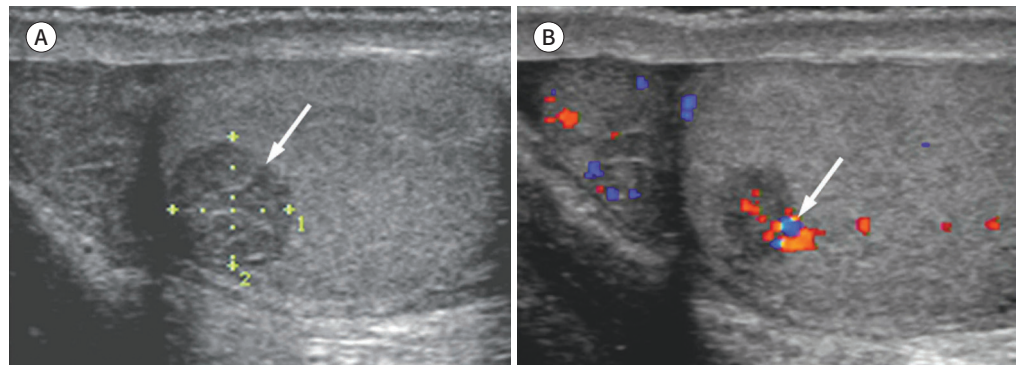


Fig. 12. Lymphoma in a 67-year-old male.

A. Longitudinal gray scale sonography shows two well-defined, hypoechoic masses (arrows) in the testis.
B. On color Doppler sonography, the masses are hypervascular (arrows).

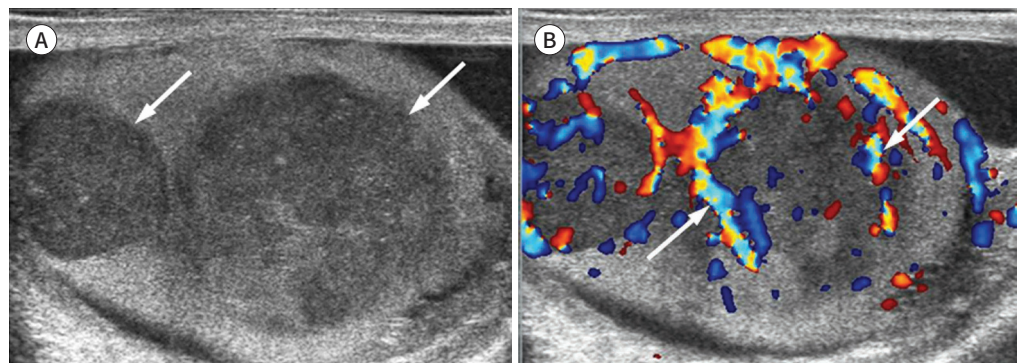


Fig. 13. Leukemia in a 21-year-old male.

- A. Longitudinal gray scale sonography shows a well-defined, hypoechoic mass (arrow) in the testis.
- B. On color Doppler sonography, the mass shows hypervascular (arrow).

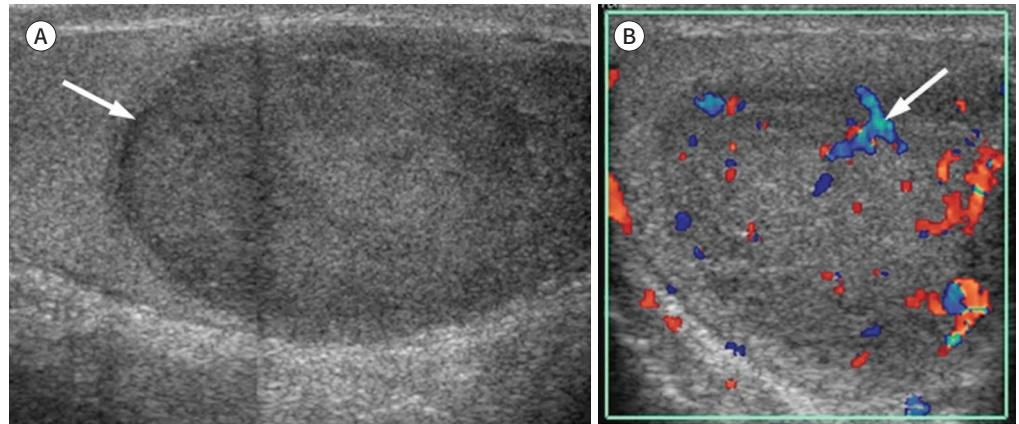
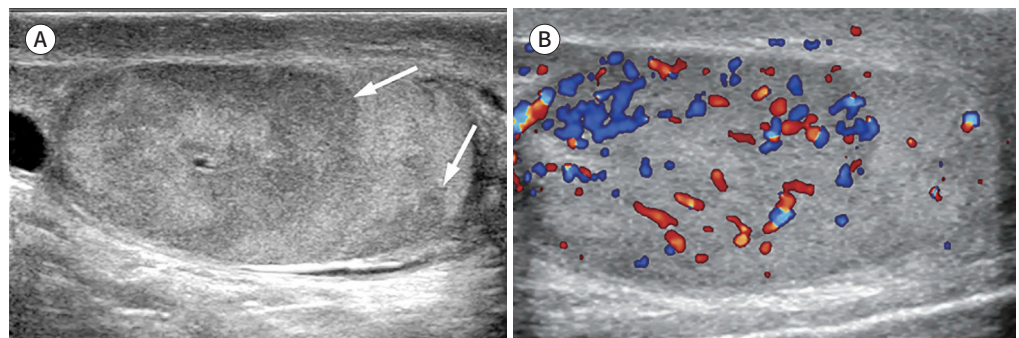


Fig. 14. Focal orchitis in a 31-year-old male.

- A. Longitudinal gray scale sonography shows heterogeneously hypoechoic lesions (arrows) in the testis.
- B. On color Doppler sonography, increased blood flow is seen within the lesions.



phoma appears as a homogeneously hypoechoic mass on sonography, with either diffuse or focal pattern (Fig. 12, 13) (7, 8). It may be seen as multiple hypoechoic lesions of various sizes. Color Doppler sonography shows increased vascularity regardless of the size of the lesions (14).

METASTASIS

Metastatic testicular tumors are uncommon. The most common primary site is the prostate, followed by the lungs, skin, colon and kidney (15). Metastatic testicular tumors are often multiple and bilateral, and are usually discovered during autopsy. They are usually seen as hypoechoic lesions on sonography (16).

INFLAMMATORY LESIONS

ORCHITIS

Epididymitis is a common scrotal inflammatory disease that usually results from the retrograde spread of urethral pathogens via the ejaculatory ducts and the vas deferens (17). About 20%–40% of cases of epididymitis are associated with orchitis, which is thought to be due to direct extension of infection into the testicular parenchyma. Orchitis appears as an ill-de-

fined, heterogeneously hypoechoic lesion (Fig. 14A) (18). Color Doppler sonography showed an increased vascularity within the lesion (Fig. 14B).

INTRATESTICULAR ABSCESS

Intratesticular abscess usually occurs secondary to the epididymo-orchitis (5). Intratesticular abscess is seen as a circumscribed, hypoechoic lesion with an irregular wall and low levels of internal echoes within inflamed areas of the testis (Fig. 15) (5). Color Doppler sonography showed no blood flow within the abscess but was increased in the peripheral portion (19).

MUMPS ORCHITIS

The most prominent manifestation of mumps is swelling and tenderness of the salivary glands. Epididymo-orchitis develops in 20% to 30% of postpubertal boys and men with mumps infection. Sonography revealed homogeneously or heterogeneously decreased echogenicity with increased vascularity (Fig. 16) (20, 21). Compared to pyogenic orchitis, mumps orchitis showed more homogeneous echogenicity on sonography and involved the entire testis.

TUBERCULOSIS

Tuberculous orchitis is caused by *Mycobacterium tuberculosis* and can occur not only

Fig. 15. Intratesticular abscess in a 86-year-old male.

- A, B.** Longitudinal gray scale sonography shows a well-defined, large hypoechoic mass (arrows) in the testis.
- B.** On color Doppler sonography, no blood flow is seen within the mass.

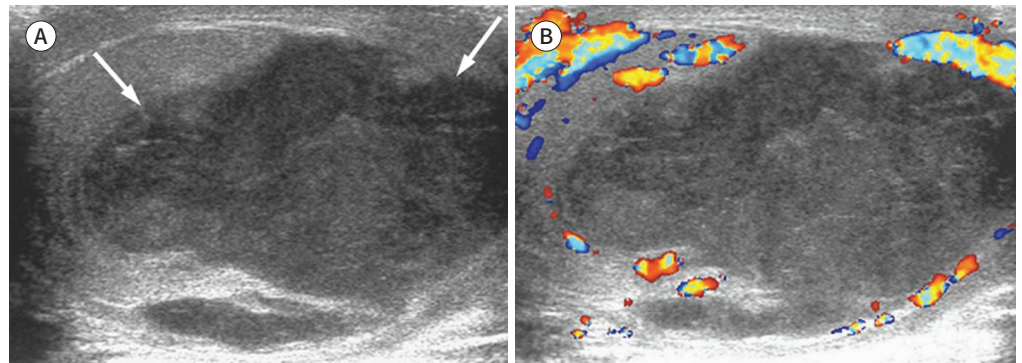


Fig. 16. Mumps orchitis in a 15-year-old male.

- A, B.** Longitudinal gray scale sonography shows an enlarged, hypoechoic right testis (R). Left testis (L) is normal.
- C.** On color Doppler sonography, the right testis is hypervascular.

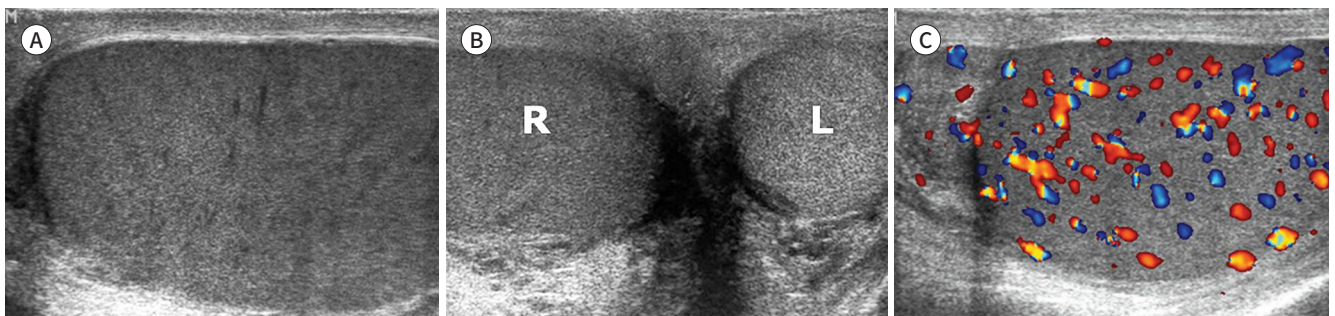


Fig. 17. Tuberculous epididymo-orchitis in a 35-year-old male.

- A.** Longitudinal gray scale sonography shows multiple, hypoechoic masses in the testis.
- B.** On color Doppler sonography, increased blood flow is seen within the lesions.

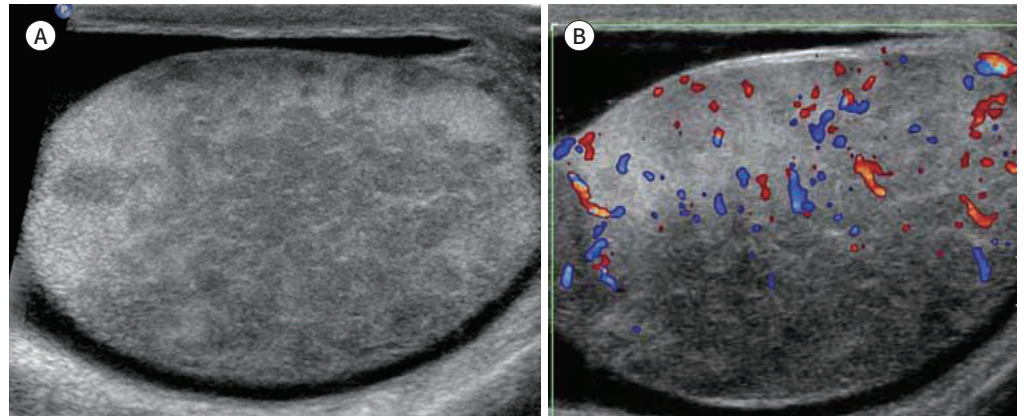
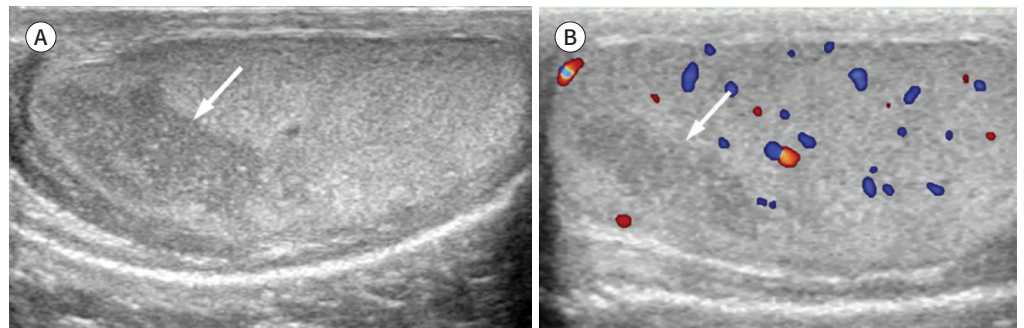


Fig. 18. Segmental testicular infarction in a 20-year-old male. The patient had a history of operation with testicular torsion 11 months ago.

- A.** Longitudinal gray scale sonography shows a hypoechoic lesion (arrow) with irregular margin in the testis.
- B.** On color Doppler sonography, no blood flow is seen within the lesion (arrow).



from retrograde spread from the prostate and seminal vesicles but also from hematogenous dissemination. Pathologically, the characteristic finding is caseating granuloma, which contains yellow-green caseous material (22). Sonography showed heterogeneously decreased echogenicity caused by caseation necrosis, granulomas, fibrosis, and calcification (Fig. 17) (22). It may be seen as multiple small hypoechoic nodules (2, 23). Color Doppler sonography shows a lower degree of blood flow in the peripheral portion (19).

SEGMENTAL TESTICULAR INFARCTION

Torsion of the spermatic cord with interruption of testicular blood flow results in acute scrotal pain. Sonographic findings can be variable depending on the degree of torsion and its duration.

Segmental testicular infarction is a localized infarct of the testis, which is related to prior testicular torsion, vasculitis, or hypercoagulable disorder (24). Gray scale and color Doppler sonographic findings of segmental testicular infarction are described as irregularly wedge-shaped or round hypoechoic lesions with absent blood flow (Fig. 18) (24, 25). In acute phase, the echogenicity of the lesion is heterogeneous due to edema and hemorrhage within the le-

sion. However, it may become homogeneous and discrete during chronic phase.

TESTICULAR TRAUMA

Testicular trauma is not uncommon and results from blunt trauma, penetrating injuries and iatrogenic injuries (26). Testicular trauma can result in a hematoma, fracture or rupture of the testis.

HEMATOMA

The sonographic appearance of an intratesticular hematoma is different depending on the duration. It is hyperechoic in the early stages and subsequently becomes heterogeneous and appears hypoechoic during the late stages (Fig. 19). Color Doppler sonography showed no blood flow in the region of the hematoma.

FRACTURE

Testicular fracture is a break or discontinuity in the normal testicular parenchyma (6, 26). Sonography showed a linear hypoechoic and avascular area within the testis (26).

RUPTURE

Testicular rupture is an abnormality in the contour of the testis resulting from the extrusion of the testicular parenchyma after disruption of the tunica albuginea (26). Sonography showed a heterogeneous echogenicity of the testicular parenchyma and discontinuation of tunica albuginea (Fig. 20) (5, 26). Color Doppler sonography showed decreased blood flow.

CONCLUSION

Gray and color Doppler sonography can help to establish the correct diagnosis of various

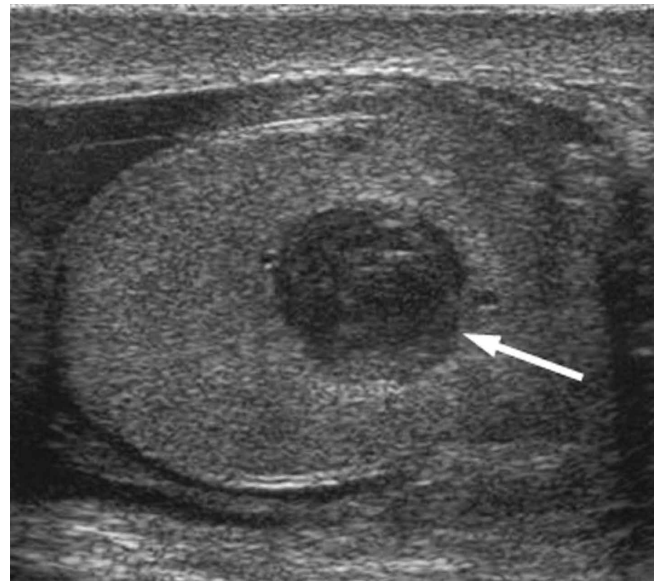
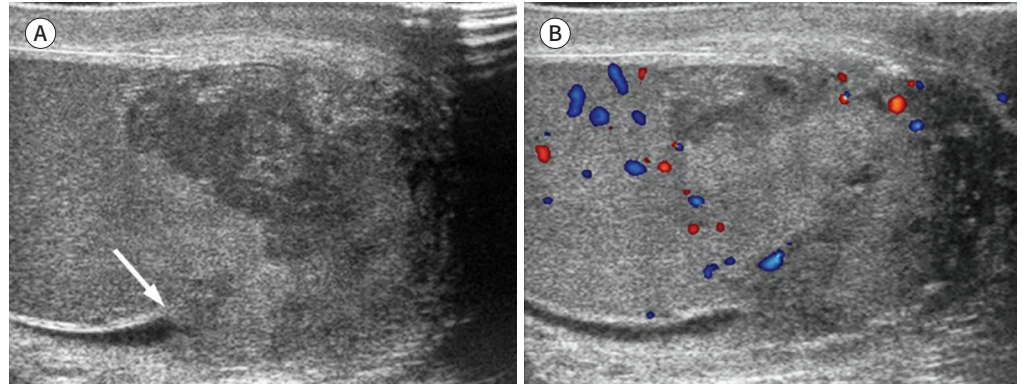


Fig. 19. Hematoma in a 28-year-old male. Longitudinal sonography shows a well-defined, hypoechoic mass (arrow) in the testis.

Fig. 20. Testicular rupture in a 46-year-old male.

A. Longitudinal gray scale sonography shows an ill-defined hypoechoic lesion in the lower portion of the testis, disruption of tunica albuginea (arrow) and irregular testicular contour.

B. On color Doppler sonography, blood flow is not seen in the hematoma after testicular rupture.



intratesticular hypoechoic lesions according to lesion echogenicity, location, margin, multiplicity, the presence of calcification and the degree of blood flow within the lesion. Characterization of nonneoplastic cystic lesions is possible by detecting their anechoic nature and location. The classic appearance of an epidermoid cyst on sonography is an onion-ring pattern with alternating hyperechoic and hypoechoic layers. Intratesticular abscess, hematoma, segmental testicular infarction and testicular rupture usually showed no blood flow within the lesion. Most intratesticular tumors and inflammatory lesions showed an increased blood flow on color Doppler sonography. Seminoma, Leydig cell tumor and lymphoma are usually seen as homogeneously hypoechoic masses on sonography. Nonseminomatous germ cell tumors of the testis usually showed heterogeneously hypoechoic on sonography and may have calcifications. Pyogenic and mumps orchitis present with ill-defined margins and tenderness is common.

Familiarity with the sonographic features of various intratesticular lesions facilitates accurate diagnosis and treatment.

Author Contributions

Conceptualization, Y.D.M.; data curation, Y.D.M., K.H.C., K.S.W.; formal analysis, Y.D.M., K.H.C., K.S.W.; supervision, Y.D.M.; writing—original draft, J.J.I., Y.D.M.; and writing—review & editing, all authors.

Conflicts of Interest

Dal Mo Yang has been a Section Editor of the Journal of the Korean Society of Radiology since 2014; however, he was not involved in the peer reviewer selection, evaluation, or decision process of this article. Otherwise, no other potential conflicts of interest relevant to this article were reported.

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REFERENCES

1. Woodward PJ, Schwab CM, Sesterhenn IA. From the archives of the AFIP: extratesticular scrotal masses: radiologic-pathologic correlation. *Radiographics* 2003;23:215-240

2. Park SB, Lee WC, Kim JK, Choi SH, Kang BS, Moon KH, et al. Imaging features of benign solid testicular and paratesticular lesions. *Eur Radiol* 2011;21:2226-2234
3. Gooding GA, Leonhardt W, Stein R. Testicular cysts: US findings. *Radiology* 1987;163:537-538
4. Woodward PJ, Sohaey R, O'Donoghue MJ, Green DE. From the archives of the AFIP: tumors and tumorlike lesions of the testis: radiologic-pathologic correlation. *Radiographics* 2002;22:189-216
5. Dogra VS, Gottlieb RH, Rubens DJ, Liao L. Benign intratesticular cystic lesions: US features. *Radiographics* 2001;21 Spec No:S273-S281
6. Martínez-Berganza MT, Sarría L, Cozcolluela R, Cabada T, Escolar F, Ripa L. Cysts of the tunica albuginea: sonographic appearance. *AJR Am J Roentgenol* 1998;170:183-185
7. Dogra VS, Gottlieb RH, Oka M, Rubens DJ. Sonography of the scrotum. *Radiology* 2003;227:18-36
8. Mirochnik B, Bhargava P, Dighe MK, Kanth N. Ultrasound evaluation of scrotal pathology. *Radiol Clin North Am* 2012;50:317-332, vi
9. Aganovic L, Cassidy F. Imaging of the scrotum. *Radiol Clin North Am* 2012;50:1145-1165
10. Cho JH, Chang JC, Park BH, Lee JG, Son CH. Sonographic and MR imaging findings of testicular epidermoid cysts. *AJR Am J Roentgenol* 2002;178:743-748
11. Hamm B, Fobbe F, Loy V. Testicular cysts: differentiation with US and clinical findings. *Radiology* 1988;168:19-23
12. Schwerek WB, Schwerek WN, Rodeck G. Testicular tumors: prospective analysis of real-time US patterns and abdominal staging. *Radiology* 1987;164:369-374
13. Maizlin ZV, Belenky A, Kunichezky M, Sandbank J, Strauss S. Leydig cell tumors of the testis: gray scale and color Doppler sonographic appearance. *J Ultrasound Med* 2004;23:959-964
14. Mazzu D, Jeffrey RB Jr, Ralls PW. Lymphoma and leukemia involving the testicles: findings on gray-scale and color Doppler sonography. *AJR Am J Roentgenol* 1995;164:645-647
15. Haupt HM, Mann RB, Trump DL, Abeloff MD. Metastatic carcinoma involving the testis. Clinical and pathologic distinction from primary testicular neoplasms. *Cancer* 1984;54:709-714
16. Pratap Singh A, Kumar A, Dhar A, Agarwal S, Bhimaniya S. Advanced colorectal carcinoma with testicular metastasis in an adolescent: a case report. *J Med Case Rep* 2018;12:304
17. Horstman WG, Middleton WD, Melson GL. Scrotal inflammatory disease: color Doppler US findings. *Radiology* 1991;179:55-59
18. Wasnik AP, Maturen KE, Shah S, Pandya A, Rubin JM, Platt JF. Scrotal pearls and pitfalls: ultrasound findings of benign scrotal lesions. *Ultrasound Q* 2012;28:281-291
19. Yang DM, Yoon MH, Kim HS, Jin W, Hwang HY, Kim HS, et al. Comparison of tuberculous and pyogenic epididymal abscesses: clinical, gray-scale sonographic, and color Doppler sonographic features. *AJR Am J Roentgenol* 2001;177:1131-1135
20. Başekim CC, Kizilkaya E, Pekkafali Z, Baykal KV, Karsli AF. Mumps epididymo-orchitis: sonography and color Doppler sonographic findings. *Abdom Imaging* 2000;25:322-325
21. Tarantino L, Giorgio A, de Stefano G, Farella N. Echo color Doppler findings in postpubertal mumps epididymo-orchitis. *J Ultrasound Med* 2001;20:1189-1195
22. Kim SH, Pollack HM, Cho KS, Pollack MS, Han MC. Tuberculous epididymitis and epididymo-orchitis: sonographic findings. *J Urol* 1993;150:81-84
23. Muttarak M, Peh WC. Case 91: tuberculous epididymo-orchitis. *Radiology* 2006;238:748-751
24. Aquino M, Nghiem H, Jafri SZ, Schwartz J, Malhotra R, Amin M. Segmental testicular infarction: sonographic findings and pathologic correlation. *J Ultrasound Med* 2013;32:365-372
25. Bilagi P, Sriprasad S, Clarke JL, Sellars ME, Muir GH, Sidhu PS. Clinical and ultrasound features of segmental testicular infarction: six-year experience from a single centre. *Eur Radiol* 2007;17:2810-2818
26. Bhatt S, Dogra VS. Role of US in testicular and scrotal trauma. *Radiographics* 2008;28:1617-1629

초음파에서 보이는 다양한 고환 내 저음영 병변

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고주파 탐촉자를 이용한 초음파 검사는 음낭 검사의 일차선택 영상기법이다. 대부분의 고환 내 병변은 초음파 검사에서 저음영 병변으로 보인다. 고환 내 저음영 병변을 악성 혹은 양성 병변으로 구별하는 것은 중요한데, 병변의 악성 혹은 양성 여부에 따라 병변의 치료가 달라지기 때문이다. 이에 본 임상화보에서는 고환의 낭성 병변, 고환 종양, 고환의 염증성 병변, 고환 구역성 경색증, 그리고 고환 외상 등 다양한 고환 내 저음영 병변의 초음파 소견들에 대해 알아보하고자 한다.

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