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Germ Cell Tumor, Ovarian

- Ovarian germ cell neoplasms (OGCNs) may be benign or malignant. These neoplasms comprise approximately 20–25 % of ovarian neoplasms overall and arise primarily in young women aged between 10 and 30.
- Germ cell tumors are a histologically heterogeneous group of tumors. The main categories of ovarian germ cell tumor are teratomas (the most common benign OGCNs), immature teratomas, dysgerminomas, endodermal sinus or yolk sac tumors, and mixed germ cell tumors. These conditions are bilateral in 10–12 % of cases, while the majority of other histologies present as unilateral ovarian masses. OGCNs often produce hormones, particularly the beta subunit of human chorionic gonadotropin (hCG), and grow rapidly.
- Patients typically present with one or more symptoms: abdominal enlargement (from the mass itself, ascites, or both; in 87 % of patients), abdominal pain (from rupture, hemorrhage, or torsion; in 85 % of patients), precocious puberty, abdominal distention, fever, abnormal vaginal bleeding (presumably from hCG production), and symptoms of pregnancy (from hCG production).

V. Panebianco, J.J. Fütterer, *MDCT and MRI in Genitourinary Imaging*, A-Z Notes in Radiological Practice and Reporting,
DOI 10.1007/978-88-470-5705-0_7, © Springer-Verlag Italia 2015

- In virtually all cases, surgery is required for definitive histological diagnosis, treatment, and staging (if malignant) of OGCNs.
- *CT* has high sensitivity in the diagnosis of *cystic teratomas*. Typically, CT images demonstrate fat, fat–fluid level, and calcifications. The presence of most of the above tissues is diagnostic of ovarian cystic teratomas in 98 % of cases. Malignant transformation should be suspected if the size exceeds 10 cm or if a mass with irregular borders is seen. When ruptured, the characteristic hypoattenuating fatty fluid can be found typically below the right hemidiaphragm.
  - *Immature teratoma*: On CT images, punctate foci of fat and scattered calcifications are indicative of teratoma. The cystic components contain serous fluid or more rarely sebaceous or adipose material. The imaging appearance is typically of a large, heterogeneous mass with fatty elements, coarse irregular calcifications, and numerous cysts of variable sizes. However, the spectrum of appearances ranges from a predominantly cystic to a predominantly solid mass. Hemorrhage may be present.
  - *Ovarian dysgerminoma*: At imaging, it appears predominantly as a solid, multilocular, and well-defined lesion. CT is able to visualize punctate calcifications and areas of attenuation due to necrosis or hemorrhage. After contrast medium administration, the malignancy shows marked enhancement, especially in the fibrovascular enhancing septa, calcification may be present in a speckled pattern.
  - *Ovarian yolk sac tumor*: The tumor typically appears as a large mass that contains both solid and cystic components. It may extend into the abdomen; bilaterality is rare.
  - *Ovarian choriocarcinoma*: On imaging, choriocarcinomas appear as highly vascular solid tumors with cystic, hemorrhagic, and necrotic areas.

- *MRI* evaluation of *cystic teratomas* usually tends to be reserved for difficult cases but is exquisitely sensitive to fat components. On MR, the lesion appears oval with well-defined margins and elevated signal in T1-weighted sequences and low signal in fat-saturated T1-weighted images. In T2-weighted images, the signal may be variable, although it tends to be similar to that of subcutaneous adipose tissue. The calcifications may not be visible on MR images or may be identifiable as areas of low signal intensity. Enhancement is also able to identify solid invasive components and as such can be used to accurately locally stage malignant variants. Extension through the tumor capsule may be present.
  - *Immature teratoma*: On MR, the small foci of fat have elevated signal intensity in T1-weighted images which fall in fat-suppressed sequences. The solid component has a wide variety of signal intensities at T2-weighted MR imaging. It may metastasize to the peritoneum, liver, or lung.
  - *Ovarian dysgerminoma*: On MR, dysgerminoma appears with low signal intensity relative to the muscle on T1-weighted images and isointense on T2 where the fibrovascular septa appear hypointense to isointense and the areas of necrosis hyperintense. Similar to CT, the septations may show marked contrast enhancement.
  - *Ovarian yolk sac tumor*: Their main feature on MRI is prominent signal voids. The bright dot sign is an enhancing foci in the wall or solid components. Areas of hemorrhage are common. Areas of hemorrhage have high signal intensity on T1-weighted MR images.
  - *Ovarian choriocarcinoma*: Abnormal large signal voids that represent vascular structures and small cystic cavities are seen in solid components at T2-weighted MR imaging, and high-signal-intensity foci, a result of hemorrhage, may be seen in solid portions at T1-weighted MR imaging.

Glomerulonephritis

- Glomerulonephritis is a term used to refer to several renal diseases. Many of the diseases are characterized by inflammation either of the glomeruli or small blood vessels in the kidneys, hence the name; but not all diseases necessarily have an inflammatory component.
- Although there are many causes of glomerular disease, most patients present with one of two patterns, nephrotic or nephritic, that are based upon the urine sediment and the degree of proteinuria.
- The role of CT in renal parenchymal disease is limited but may be useful in selected cases. Non-contrast CT is useful in detecting renal parenchymal calcifications. For patients with renal parenchymal disease, contrast enhancement should be avoided if possible. Contrast-enhanced CT scan may provide useful information regarding the pattern of contrast enhancement and excretion in patients with impaired renal function. Globally absent nephrogram is due to pedicle trauma in most cases, and segmental absence may be due to focal infarction, pyelonephritis, or acute renal failure secondary to renal vasoconstriction.
- Recent advances in MR imaging such as breath-holding rapid imaging technique and renal functional MR imaging such as dynamic contrast-enhanced study, diffusion-weighted (DW) study, and blood oxygen level-dependent (BOLD) study extended the role of MR imaging in the evaluation of renal parenchymal diseases. Gadolinium-based contrast media are used routinely for MR imaging of the kidney. Most normal kidneys show a distinct contrast between the renal cortex and medulla on T1-weighted images, whereas the signal intensities of the renal cortex and medulla are similar on T2-weighted images. Obliteration of the corticomedullary contrast on T1-weighted spin-echo image is regarded as a

sensitive but nonspecific finding of the renal parenchymal disease. The parenchymal enhancement pattern is more clearly demonstrated on gradient-echo imaging than on T1-weighted spin-echo imaging. DW and BOLD MR imaging may yield information on kidney function. Both techniques provide highly reproducible results in patients with good renal function and hold promise for noninvasive monitoring.

Gonadoblastoma

- Gonadoblastoma is a rare benign tumor that has the potential for malignant transformation and affects a subset of patients with an intersex disorder or disorder of sex development (DSD). Most of these tumors are identified within the first two decades of life.
- Gonadoblastoma does not demonstrate invasive behavior; however, 50 % of the specimens demonstrate evidence of local overgrowth by the germinal component, and approximately 10 % of these germinomas/seminomas arising within this context have demonstrated metastases.
- Imaging studies are useful in diagnosing features of intersexuality in newborns but have a limited role in the diagnosis of gonadoblastoma. All of these studies help to identify patients at risk of developing gonadoblastoma in addition to characterizing the specific intersex disorder. In patients that present later in life, localization studies such as ultrasonography, CT scanning, and MRI may be useful. The tumor appearance is similar to that of dysgerminoma, except that in dysgerminoma arising from gonadoblastoma, there are often calcifications (rarely found in pure dysgerminomas).

Suggested Reading

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