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Segmental Infarction of the Testis: Report of Three Cases

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Abstract

Segmental testicular infarction is a rare cause of acute scrotum and can easily masquerade as a tumor on ultrasonography and color Doppler imaging. The present report of three cases describes three patients with segmental testicular infarction, which were all suspicious for tumor on ultrasonography/color Doppler imaging. All of the cases were finally diagnosed by pathological examination. It is hypothesized that if the arterial flow is impaired because of abnormalities in arteries, excessive intrascrotal movement of testis, torsion and detorsion (which are all risks with the bell-clapper anomaly) or an unobserved interruption of an arterial blood flow during operations, predisposition to a partial infarct will result, mostly in the upper pole of the testis. In this report, first case of infarction was in the center of the testis, second one in the lower pole and third in the upper pole. Third case had a small concurrent seminoma which was discovered microscopically on the permanent HE slides of the intraoperative biopsy. We could not find such a case in the literature. It is debatable if the cause of the infarction in this case is because of an anomaly in some vessel or because of the possible cancer-associated thrombosis of the adjacent seminoma. Diagnosis of segmental testicular infarction is a radiological problem in standard practice and the final diagnosis still belongs to the pathologist. Intraoperative biopsy is a fiducial option for correct diagnosis of the segmental lesion in testis of unsure origin.

Keywords: Segmental Testicular Infarction; Acute Scrotum; Case Report; Ultrasonography; Seminoma; Vascular Abnormalities; Bell-Clapper Anomaly

Introduction

Segmental testicular infarction is a rare cause of acute scrotum [1]. It usually results from arterial embolization or thrombosis (as opposed to testicular infarction from torsion, which may originate from venous occlusion which turns to arterial occlusion and then ischemia) [2-4]. The causes of a segmental testicular infarct include: orchitis, sickle cell disease, trauma, pelvic surgery (such as herniorrhaphy) and vasculitis [2]. However, up to 70% of reported cases are idiopathic [5]. Torsion of the testis, testicular tumor and infection are important differential diagnoses [1]. Segmental infarction of the testis can easily masquerade as a mass lesion, thus requiring exclusion of tumor. In segmental infarction of the testis, if clinical exams do not exclude a neoplastic lesion with certainty, orchidectomy is usually performed [6]. On histological slides of infarcted testicular parenchyma due to torsion one can see hematoma/hemorrhage and damaged blood vessels with coagulative necrosis resulting in ghost outlines of tubules with necrotic germ cells [4, 7]. The present report of three cases describes three patients with segmental testicular infarction, where one of them had a small concurrent tumor.

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Cases

Case 1

A 42-year-old male patient noticed a swelling of the left testis with occasional pain of two to three weeks duration. He was treated for epididymitis. After antibiotic therapy ultrasonography revealed an irregular mass in the central part of the left testis, measuring 25x13mm in size, primarily suspicious for tumor. Left testis was discretely hypoechoic. With color Doppler analysis flow was found to be maintained in both testicles. Central part of the left testis was firm, epididymis was painless and there was no scrotal effusion. Tumor markers (human chorionic gonadotropin, alpha-fetoprotein) were normal. Level of lactate dehydrogenase was high - 385 units/L 37°C (upper limit is 241 units/L 37°C). Orchidectomy was performed. On gross pathologic examination on cross section there was a hemorrhagic mass 1, 5cm in diameter in the central part of the testis.

Microscopically, there was hematoma and minor focuses of hemorrhage and necrotic areas without structure in adjacent testicular parenchyma. There were infiltrates of inflammatory cells and many myofibroblasts in the parenchyma. Infiltrates of inflammatory cells were also seen in the other testicular structures and spermatic cord. Retained spermatogenesis was not seen. There were blood vessels with thicker walls, some thrombosed. Immunohistochemically, there was negative reaction for placental alkaline phosphatase (PLAP) and octamer-binding transcription factor ¾ (OCT3/4). Also, there was negative reaction histochemically on PAS (Periodic acid–Schiff) staining. There was no tumor or intratubular germ cell neoplasia.

Case 2

A 36-year-old male patient had pain in the right testis for two days. On palpation, right testis was firmer in the lower pole area and extremely painful to the touch. On ultrasonography, there was an area of heterogeneous change in the lower pole of the testicular parenchyma and the process was suspicious for tumor. Tumor markers (human chorionic gonadotropin, alpha-fetoprotein) and level of lactate dehydrogenase were normal. Intraoperatively (orchidectomy) pathological resistance the size of a larger pea was recognized by palpation. On gross pathologic examination on cross section of the testis there was a brownish area 1, 5cm in diameter (Figure 1) in the lower pole of the testis. Microscopically, there was hemorrhagic infarction. Tubules in the adjacent parenchyma of the testis had only Sertoli cells („Sertoli cell only syndrome“). There was no tumor.

Case 3

A 21-year-old male patient noticed induration in the left testis. There was palpatory oval firmer resistance in the left testis. Ultrasonography revealed an oval, poorly demarcated anechoic to hypoechoic area with the „halo“border in the upper pole of the testis. With color Doppler analysis there was peripheral vascularization of the mentioned area, and to the radiologist it primarily corresponded to the infiltrative expansive process. Area was about 1 cm in diameter. On both testicles there were calcifications up to 2 mm in diameter. Tumor markers (human chorionic gonadotropin, alpha-fetoprotein) were normal. Level of lactate dehydrogenase was high - 343 units/L 37°C (upper limit is 241 units/L 37°C).

Firstly, the suspicious part of the testis was excised. The dimensions of the excised tissue were 2x1, 5x1cm, and on cross section there was a yellow nodule 0, 8cm in diameter. On intraoperative frozen section analysis the nodule corresponded to necrosis. The testis was not removed.

On permanent HE analysis of the intraoperative biopsy there was (in the vicinity of necrosis) a tumor which was only 3mm in diameter made of atypical, large seminomatous cells with few mitoses seen. It was a seminoma. In the adjacent parenchyma of the testis there was intratubular germ cell neoplasia. Immunohistochemically, tumor cells and intratubular germ cell neoplasia were positive for PLAP and OCT3/4. Tumor was close to rete testis and close to one resection margin. Orchidectomy was performed. On cross section of the testis there was a hemorrhagic area about 2cm in diameter (Figure 2). Microscopically, there was segmental infarction of the testis with foci of haemorrhage (Figure 3A and B), and fibrosis and multinuclear giant cells were seen

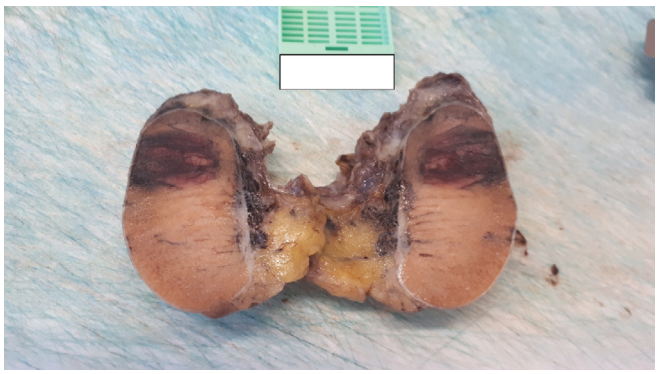

Figure 1: Segmental infarction of the testis: hemorrhagic area.

Figure 2: Segmental infarction of the testis: hemorrhagic area.

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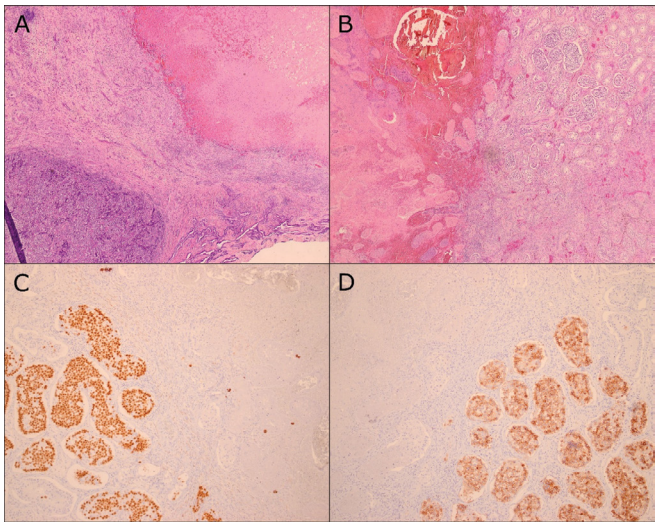

Figure 3: A: On the lower left side of the picture there is small seminoma and on the upper right side there is infarction seen. (40x magnification) B: On the left side od the picture there is segmental infarction of the testis. On the right side there is still viable testicular parenchyma with intratubular germ cell neoplasia. (40x magnification) C: Intratubular germ cell neoplasia stained immunohistochemically with OCT3/4. (100x magnification) D: Intratubular germ cell neoplasia stained immunohistochemically with PLAP. (100x magnification).

on the edge of the lesion. There was extensive intratubular germ cell neoplasia (in 65% of the examined testicular parenchyma), which was shown immunohistochemically (PLAP, OCT3/4) (Figure 3C and D). There was no additional invasive tumor seen.

Discussion

The blood supply to the scrotal structures is from three primary arteries: the testicular, deferential and cremasteric arteries [8]. The mediastinum testis extends along the whole length of the posterior border of the gland. From the front and sides of the mediastinum testis radiating fibrous strands pass through the substance of the testis. The blood vessels have a very definite arrangement with reference to fibrous framework. After they have passed through the mediastinum they spread out upon the surfaces of the fibrous septula and on the deep surface of the tunica albuginea. The vascular meshwork thus formed is sometimes called the tunica vasculosa [9]. According to Fernández-Pérez et al., if the arterial flow is impaired because of abnormalities in arteries, predisposition to a partial infarct will result, particularly when there are no significant collateral vessels supplying one or several testicular lobules. They explained a propensity for an infarct in the upper pole of the testis when the anterior epididymal artery (one of the branches of the testicular artery) is absent or has an impaired flow because of an excessive intrascrotal movement of testis, torsion and detorsion, which are all risks with the bell-clapper anomaly, or an unobserved interruption of an arterial blood flow during operations performed on spermatic cord within inguinal canal. This possible association with the bell-clapper anomaly must be noted because of the probability that disorders in maturation of the testicular parenchyma and the testicular vessels may lead to a segmental infarction.

Their point of view may also explain why, in more than 80% of the patients in their case series, the infarction was in the upper hemisphere of the testis [10]. However, in the cases of our report one infarction was in the centre of the testis, one was in the lower pole and one was in the upper pole (in the case with the adjacent seminoma).

The differential diagnosis in acute scrotum, particularly torsion of spermatic cord and epididymitis, is sometimes difficult. An erroneous diagnosis may result in unnecessary and improper treatment [11]. Importantly, testicular cancer may present with sudden pain often associated with hemorrhage within the tumor, being a cause of acute scrotum in 4.3% of cases [12, 13] Segmental testicular infarction is often clinically indistinguishable from other etiologies of scrotal pain. The diagnosis often relies on imaging studies, with testicular neoplasm being the most important differential diagnosis [14]. Color Doppler ultrasonography is an excellent, safe, and reliable method for evaluating patients with scrotal disease. It aids in diagnosis of testicular tumors and reduces the number of unnecessary exploratory operations. It is especially important in conditions like testicular torsion where immediate diagnosis is required [15]. However, the problem still exists in diagnosing patients with segmental testicular infarction.

Scanned by color Doppler sonography, the normal testis is ovoid and has homogeneous isoechogenicity with moderately distributed vascularity, while testicular torsion presents with various echogenicities and absent vascularity [16]. On ultrasonography, solid masses usually appear hypoechoic relative to the adjacent testicular parenchyma, and internal vascularity is usually detectable with color Doppler imaging [17]. Segmental testicular infarction is a partial ischemic process observed on color Doppler sonography as an area without vascular flow. However, in some cases, differentiation of segmental testicular infarction from a small intratesticular tumor, which may have a low flow, is difficult [10, 18-27]. All three cases of infarction in this report were radiologically suspicious for tumor and the final diagnosis was made by a pathologist. In the first case of this report, with color Doppler analysis, flow was found to be maintained even in both testicles.

In the third case of this report, there was peripheral vascularization of the analyzed area on color Doppler imaging, and the unexpected concurrent tumor was found only microscopically (it was 3 mm in size). Enhanced MRI, by which the intratesticular blood flow can be evaluated,

may be useful for the diagnosis of testicular infarction [11]. MRI of the acute scrotum is considered to be important for avoiding unnecessary surgical treatment [28].

Third case in this report had incidental concurrent seminoma along with the segmental testicular infarction. We could not find such a case in the literature. It is debatable if the cause of the infarction in this case is because of an anomaly in some vessel or the influence of the adjacent seminoma. We propose that some kind of mechanism of cancer-associated thrombosis played a role in this case of segmental testicular infarction [29, 30].

Because there was a very small concurrent seminoma with extensive intratubular germ cell neoplasia along with the segmental infarction, we also propose that intraoperative biopsy should be standard practice in cases of segmental lesion in testis of unsure origin.

Conclusion

Diagnosis of segmental testicular infarction is a radiological problem in standard practice and the final diagnosis still belongs to the pathologist. Intraoperative biopsy is a fiducial option for correct diagnosis of the segmental lesion in testis of unsure origin.

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