

ACTAS UROLÓGICAS ESPAÑOLAS

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Short original – Testicular cancer

Segmental infarct of testicle: an infrequent pseudotumor

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ARTICLE INFORMATION

Article history:

Received on 16 December, 2008

Accepted on 14 September, 2009

Keywords:

Testis infarction

Testicular pseudotumor

ABSTRACT

Objective: To review the morphologic features of the segmental infarct of testicle with special insistence in the differential diagnosis with a testicular tumor.

Material and methods: Retrospective revision of the cases with pathologic diagnostic of segmental infarct of testicle diagnosed and treated in our institution. In the selected cases, we review the histological slides and we collected the clinical and radiological features.

Results: We reported 6 cases with the following clinic-pathological features: the average age was 42 years old, both right and left testicles were affected with the same frequency, and the aetiology was idiopathic, trauma or inflammation. All of them with pathological diagnosis of segmental infarct of testicle, either acute or chronic, and in all of them a testicular tumor was suspected.

Conclusion: Segmental infarct of testicle is an unfrequent cause of testicular pseudotumor. It must be considered in the clinical differential diagnostic of testicular masses in order to avoid unnecessary orchiectomies.

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Infarto testicular segmentario: un pseudotumor infrecuente

R E S U M E N

Objetivo: revisar las características morfológicas del infarto testicular segmentario, incidiendo en el diagnóstico diferencial que clínica y radiológicamente plantea con un tumor testicular.

Material y métodos: revisión retrospectiva de los casos con diagnóstico anatomopatológico de infarto testicular segmentario diagnosticados y tratados en nuestro centro. En los casos seleccionados se revisaron las laminillas histológicas y se recogieron las características clínicas y radiológicas.

Resultados: se localizaron 6 casos con las siguientes características clinicopatológicas: una media de edad de 42 años, afectando con la misma frecuencia al teste derecho y al izquierdo.

Palabras clave:

Infarto testicular

Pseudotumor testicular

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do, de causa idiopática o con antecedentes traumáticos o inflamatorios y con diagnóstico histológico de infarto segmentario, ya sea agudo o crónico (en dos de ellos). Común a todos ellos es la sospecha clínica de tumor testicular.

Conclusión: el infarto testicular segmentario es una causa de pseudotumor testicular. Aunque infrecuente, debe considerarse en el diagnóstico diferencial clínico de las masas testiculares para evitar orquiectomías innecesarias.

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Introduction

Testicular infarction almost always affects the entire body and only rarely a segment of the body. Global testicular infarction tends to occur in prepubertal boys or young adults, and is due to intravaginal torsion of the spermatic cord.

When testicular infarction is segmental, it may be confused clinically and radiologically with a testicular tumor. We therefore report our experience with localized infarctions that clinically mimicked a testicular tumor mass.

Materials and methods

We retrospectively searched for specimens from total or partial orchiectomies performed for a nontumor cause from 1990 to 2006, selecting those where the pathological diagnosis was localized or segmental infarction. In the cases selected, histological slides were reviewed and clinical and radiological features were collected.

Results

The clinicopathological features of the patients found in our institution are summarized in Table 1. The average age was 42 years and both sides were affected with the same frequency. Two cases had no pathological history, another two had a previous lesion (spontaneous or postherniorrhaphy) and it should be pointed out that the other two patients had a history of brucellosis. The clinical presentation was a tumor mass in all of them, with pain in only two of the patients. Tumor markers (α -fetoprotein and β -hCG [human chorionic gonadotropin]) were negative in all cases. Ultrasound showed a hypoechoic mass in 5 patients and a heterogeneous paraepididymal mass in the other patient. In one case (case 5), Doppler ultrasound showed a 20-mm hypoechoic nodule in the lower pole, with well-defined contours and evidence of peripheral circulation.

In 5 of the 6 cases, total orchiectomy was performed. The pathological study showed a segmental hemorrhagic infarction in three patients, an ischemic infarction in one (with a recent history of trauma treated with a partial

orchiectomy), and two scar infarctions (one of them with a history of bilateral herniorrhaphy and the other with history of brucellosis and orchitis). The microscopic study only found an lesion from focal obliterative angiitis in a patient with previous brucellosis.

Discussion

Segmental testicular infarction is an uncommon condition, whose clinical and radiological presentation resembles that of a tumor, and tends to prompt treatment by radical surgery.

Most cases of testicular infarction occur due to obstruction of venous return¹. Interruption of venous drainage causes edema, vascular congestion, rupture of the venous wall and interstitial bleeding². In cases of global infarction, vascular obstruction is usually due to an intravaginal torsion of the spermatic cord, but there have also been reports of global infarction without evidence of testicular torsion^{3,4}. However, in the reported cases of segmental infarction such torsion was not observed on surgical examination. Therefore, the etiology is questionable and it is considered that, whatever the triggering factor, the lesion starts with venous rupture, followed by thrombosis and infarction. Location of segmental infarction will depend on the distribution of bleeding and the extent of thrombosis⁵.

The first case of segmental infarction was reported in the literature in 1909 and was an autopsy finding in a 45-year-old male with polycythemia (cited by Johnston⁶). Since then, some 63 cases have been reported (Table 2). Several etiological or predisposing factors for segmental infarction have been published (Table 3). Of the cases reported in the literature, most are idiopathic, although they are described as related to blood dyscrasias^{6,7}, such as polycythemia or sickle cell anemia, physical exertions^{5,8}, spontaneous or surgical lesions^{2,4,6,9}, or prior vasectomies¹⁰⁻¹². Of the 5 cases reported in children^{4,6,13,14}, two are idiopathic; in one a neonatal urinary infection was noted and in the other a history of either obstetric or accidental trauma was reported.

Because the clinical symptoms of segmental testicular infarction are nonspecific and depending on the cause and the time since diagnosis may overlap with those of an acute complete infarction and the nonspecific symptoms

Table 1 – Clinicopathological features of cases of testicular infarction reported

n	Age	Testis	Past medical history:	Reason for consultation	Physical examination	Ultrasound scan	Clinical suspicion
1	47	R	No	Acute testicular pain	Shrunk and indurated testis	17-mm hypoechoic area suggestive of tumor	Testicular tumor
2	67	R	Bilateral herniorrhaphy Prostatic syndrome Parkinson's disease	Accidental finding of testicular mass	Enlarged and indurated testis	Heterogeneous paraepididymal mass	Testicular tumor
3	37	L	Brucellosis Spontaneous pneumothorax	Testicular mass	3 cm hard nodule	22 mm hypoechoic intraparenchymatous nodular lesion	Testicular tumor
4	37	L	No	Testicular discomfort	Varicocele and small painful nodule	Hypoechoic heterogeneous image in middle third, suggesting tumor	Testicular tumor
5	15	L	Left testicular trauma a month before	Painful and enlarged testis	Enlarged testis with bruising at scrotal base	Lower pole solid and hypoechoic in 2-3 cm	Traumatic orchiepididymitis and persistent nodule
6	53	R	HBP Orchitis and brucellosis	Testicular mass	Testicular atrophy and irregular hard nodule in epididymis	Hypoechoic intraglandular image of poorly-defined margins	Testicular tumor

HBP: high blood pressure.

Table 2 – Segmental testicular infarction: A literature review

Testis	Past medical history	Reason for consultation	Clinical diagnosis
x	Polycythemia	x	x
R	Severe testicular pain related to sudden exertion three weeks earlier	Testicular pain	Umbilical cord torsion
R	Severe testicular pain related to intercourse two weeks earlier	Testicular pain and fever	Traumatic testicular injury
L	None	Redness, swelling, and scrotal pain	Torsion of hydatid of Morgagni
R	Testicular injury playing soccer	RIF pain and vomiting since hours before	Testicular torsion
x	Polycythemia	x	x
L	Neonatal urinary infection	2.5 cm firm mass in left groin. Irritability	Tumor of undescended testicle
R	Sx for incarcerated inguinal hernia	Progressive swelling in right groin and fever after Sx	x
L	Insidious onset of symptoms related to exertion (weight lifting). History of orchiepididymitis	Pain and mass in the left hemiscrotum Epididymitis symptoms since 2 weeks before	Testicular mass
L	Treated for epididymitis	Testicular mass of two months' duration	Suspected testicular mass
R	Treated for epididymitis	Testicular pain	Suspected testicular tumor
R	None	Acute testicular pain	Suspected testicular tumor
L	None	Inguinoscrotal pain of two days' duration	Suspected testicular tumor
R	Obstetric trauma: long and difficult vaginal delivery with application of forceps in the testicular area	Bilateral testicular swelling (greater in right)	Bilateral testicular torsion. Right side more affected
L	Vasectomy two years before, when discomfort started	Nonspecific pain in left testis	Suspected testicular tumor
R	None	Self-limited acute testicular pain and swelling since two months before	Suspected testicular tumor
R	None	Pain in the right iliac fossa	Suspected testicular tumor
R	Treated for three days with ATB for suspected orchiepididymitis	Testicular pain since three days before	Segmental area of acute ischemia (Doppler ultrasound)
R	None	Acute, severe testicular pain	Segmental testicular infarction; ultrasound: hypoechoic triangular avascular area; MRI: Well-defined testicular lesion with a central low intensity area and a peripheral zone with high uptake

Pathological diagnosis
Segmental hemorrhagic infarction
Chronic granulomatous epididymitis (TB) Testicular scar infarction in upper pole
Segmental hemorrhagic infarction Focal obliterative angiitis
Segmental hemorrhagic infarction Fibrosis and surrounding tubular sclerosis
Partial orchiectomy: coagulative necrosis in 50% of submitted tissue
Segmental scar infarction in lower pole

of a testicular tumor, diagnosis is based on radiographic findings, when a triangular-shaped lesion with marked rim enhancement is observed. Doppler ultrasound is the diagnostic test of choice¹⁵; but, as our series is retrospective, it is available in only one case.

From the pathological viewpoint, diagnosis of segmental infarction presents no difficulties. The most important point is to rule out that is an infarcted or bleeding tumor, common changes in seminoma. The morphology of the infarction will depend on the type of lesion, the extent of ischemia and time since onset. In the acute cases due to venous obstruction, an increase in testicular size and a hemorrhagic infarction occurs, in cases with arterial obstruction there is ischemic necrosis, and in chronic cases the parenchyma is replaced by fibrous and/or necrotic tissue. Macroscopically, segmental infarction presents as a well-demarcated area, which may be triangular in shape. The coloring will be reddish in cases of acute onset (Fig. 1), or whitish in chronic cases (Fig. 2). Microscopically, hemorrhagic segmental infarction shows a hemorrhagic area displacing and surrounded by the testicular parenchyma, with interstitial bleeding and degenerated seminiferous tubules¹⁶. Interstitial edema, vascular ectasia, and extravasated red blood cells or granulation tissue can

Treatment	Pathological diagnosis
Autopsy finding Radical orchiectomy	Partial testicular infarction Triangular area of infarction with a hemorrhagic border
Radical orchiectomy	Testicular infarction affecting middle third. Thrombosis of surrounding arteries
Partial orchiectomy (resection of necrotic upper third)	Unidentifiable hemorrhagic material
Partial orchiectomy (resection of necrotic upper third)	Hemorrhagic infarction
Radical orchiectomy	Segmental infarction
Radical orchiectomy	Focal necrotic ischemia and fibrosis in immature testicle
Radical orchiectomy	Segmental hemorrhagic infarction, subalbugineous
Radical orchiectomy	Segmental infarction affecting the testicular middle third of two weeks's duration
Radical orchiectomy	Segmental infarction
Radical orchiectomy	Hemorrhagic segmental infarction
Radical orchiectomy	Hemorrhage and congestion with focal degenerative changes
Radical orchiectomy	Hemorrhagic segmental infarction
Right radical orchiectomy and left orchidopexy	x
Radical orchiectomy	Segmental infarction, fibrosed, old
Radical orchiectomy	Segmental hemorrhagic infarction
Radical orchiectomy	Vascular changes in the vascular pedicle
Radical orchiectomy	Segmental hemorrhagic infarction.
Partial orchiectomy (resection of the affected lower pole)	Acute segmental testicular infarction
Partial orchiectomy	Testicular infarction (of the material provided)

(continued)

Table 2 – Segmental testicular infarction: A literature review

Testis	Past medical history	Reason for consultation	Clinical diagnosis
R	Treated with anti-inflammatory drugs	Acute pain and testicular swelling	Ultrasound: 2. Hypovascular, hypoechoic solid lesion. MRI: central hypotensive lesion with peripheral rim enhancement
L	None	Acute pain and testicular swelling	Ultrasound: Well-defined avascular lesion in the upper pole. Suspected segmental testicular infarction
L	Vasectomized	Increased scrotal volume	Intratesticular nodular image suggestive of malignancy and hydrocele
L	Sickle cell trait	Acute testicular pain since 24 hours before	Hypoechoic area without vascularization (Doppler ultrasound)
L	Nephrectomy and testicular mass resection. Vasectomy	Edema and testicular pain	Segmental infarction
R-L	Polycythemia, orchitis, vasculitis, idiopathic...	Acute scrotum, casual finding...	Segmental infarction

ATB: antibiotics; Sx: surgery; MRI: magnetic resonance imaging.

Table 3 – Possible causes of segmental infarction

Testicular trauma (spontaneous, surgical, obstetric)
 Infections (urinary infection, epididymitis, orchitis)
 Sudden physical exertion
 Vasculitis
 Fibroplasia of medial spermatic artery
 Polyarteritis nodosa
 Thromboangitis obliterans
 Polycythemia, sickle cell anemia
 Arterial thrombosis by protein S deficiency
 Spermatic artery embolism by cholesterol emboli
 Spontaneously corrected torsion of the spermatic cord
 Venous rupture with thrombosis
 Hypertensive angitis

be noted in the periphery^{2,5}. In addition, we may find accompanying morphological features that may guide us as to the origin of the infarction. Among the vascular changes that should be highlighted are hyaline changes and arterial thrombosis⁹, medial hypertrophy⁸, venous congestion, intimal fibrosis and vasculitis (Fig. 3).

Both in the published cases (Table 2) and in our series (Table 1), the cases of acute hemorrhagic segmental infarction predominated. Among our cases, four show an acute hemorrhagic morphology and two a chronic scar appearance. It should be noted that in the two cases of chronic morphology were patients seen because of the casual finding of a testicular mass, years after the clinical event that can be considered as the triggering factor. The acute hemorrhagic or chronic scar morphology will depend on the time elapsed from the lesion and orchiectomy, not the cause leading to it. Among the 4 cases of acute clinical onset and morphology, only one of them had a clear traumatic history, and the rest were without a justified cause.

Both in our series and in the literature reviewed, most segmental infarctions led to radical orchiectomy. From the first reported cases, partial orchiectomy was recommended for the treatment of segmental infarction whenever it can be diagnosed with certainty and the presence of a testicular tumor rejected with intraoperative biopsy. Only one group¹⁷ recommends total orchiectomy to prevent infertility. In childhood cases, either because it is easier to determine a potential cause or in order to avoid radical orchiectomy at an early age, is where more partial orchiectomies are performed. In contrast, in adults is where idiopathic cases with a clinical suspicion of testicular tumor predominate, which are generally treated with radical orchiectomy.

In fact, some authors¹⁵ recommend a conservative watchful waiting approach if it is clinically suspected that the infarction is segmental, avoiding any form of surgery.

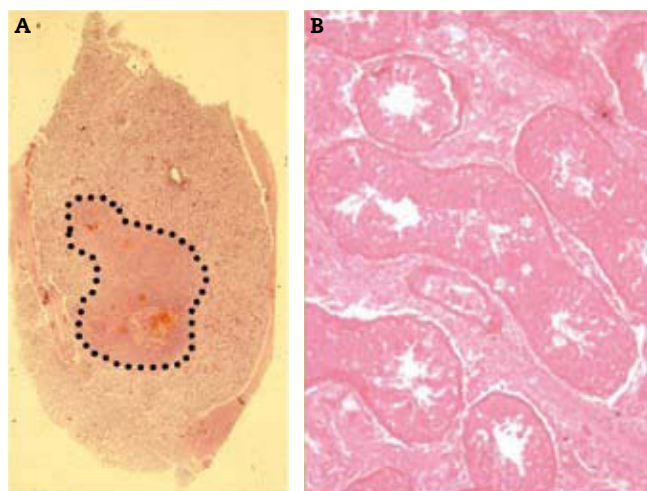


Figure 1 – A. Overall microscopic image of an acute segmental testicular infarction (4×). B. Necrosis of testicular parenchyma (hematoxylin-eosin, 400×).

(Continued)

Treatment	Pathological diagnosis
Partial orchiectomy	Testicular infarction (of the material provided)
Partial orchiectomy	Testicular infarction (of the material provided)
Radical orchiectomy	Segmental testicular infarction
Partial orchiectomy: excision of involved area and peroperative	Acute segmental testicular infarction
Watchful waiting and conservative treatment	xxx
Watchful waiting and conservative treatment, partial orchiectomy (3 patients)	Segmental testicular infarction: PAN, vasculitis, no morphological cause

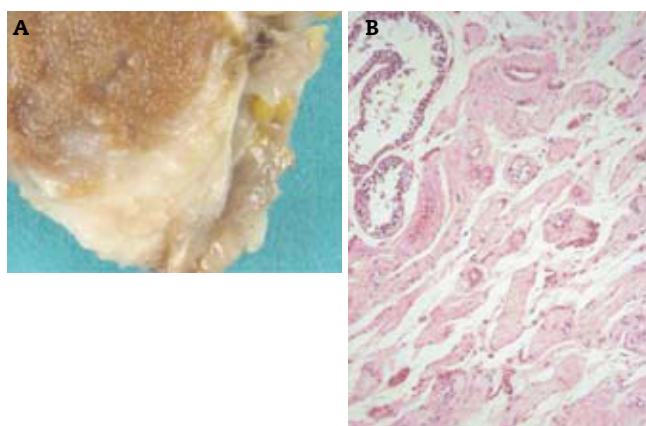


Figure 2 – Whitish area of increased consistency (A), which histologically corresponds to a chronically infarcted segment (hematoxylin-eosin 400×) (B).

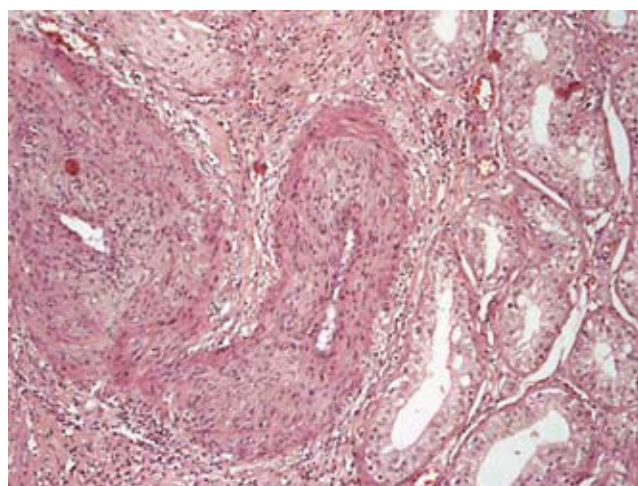


Figure 3 – Lymphocytic Infiltrate affecting arterial intima (hematoxylin-eosin, 400×).

Conclusions

Segmental testicular infarction causes testicular pseudotumor lesions that should be considered in clinical differential diagnosis of testicular masses. In cases of clinical suspicion and radiological confirmation, one may choose between partial orchiectomy with peroperative biopsy or watchful waiting with regular follow-up, according to the characteristics of each case. Total orchiectomy remains indicated in cases of testicular atrophy, orchialgias unresponsive to treatment and, of course, in cases of diagnostic doubt¹⁰.

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