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The Testicular Pathologies in Rams of the Algerian Local Breed "Rembi" Clinical and Histopathological Classification

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ABSTRACT

This study aimed to estimate the prevalence of genital pathologies in rams of one of the local Algerian breed "Rembi rams" at Tiaret slaughter house (West of Algeria). It was based on macroscopic and histological description of testicular and epididymal abnormalities. These pathologies were identified by inspection and palpation of all parts of the testis and the epididymis, compared to healthy organs. Of the 2750 studied rams, various genital abnormalities have been identified (Cryptorchidism: 4%, hypoplasia/atrophy: 3% and Orchitis/Epididymitis: 0.5%). From the Histological point of view, the seminiferous tubules showed significant alterations leading to complete loss of spermatogenesis. The epididymis has undergone an extensive and profound destruction of its walls with a significant loss of its basal and glandular cells. In addition to these clinical and histological observed results, a bacteriological examination is essential to identify any germs involved in the pathology.

Key words: Rams, Algerian Rembi breed, testis, epididymis, histopathology

INTRODUCTION

In Algeria, sheep farming is the most predominant among the other. It represents over than 80% of the national herd with a Workforce of about 19 million heads (Boulkaboul and Moulaye, 2006). Animals are reared into semi extensive livestock and exploited on a mixed production system (meet, wool and milk).

The morphological and histological changes of rams testis and epididymis are few studied compared to other pets (Barenton *et al*., 1982; Ferreras *et al*., 2007), particularly for sheep living in areas where extensive farming conditions predominates and where nutritional and sanitary conditions are adverse (Massanyi *et al*., 2003; Abdelhadi *et al*., 2010). High ambient temperature and humidity are the major constraint on sheep productivity in tropical and subtropical areas. The spermatogenesis and testicular function decrease during summer which is related to photoperiod (Dehghan *et al*., 2010). Some toxic substances can also affect the reproductive tract (Tajik *et al*., 2007). These animals, particularly ruminants, are thus exposed to various diseases responsible for the reduction of fertility.

The diagnosis of these disorders is primarily based on clinical appearance (Fthenakis *et al*., 2001); it can nevertheless be supplemented by an ultrasound exam that can determine the actual condition of the body's internal architecture of the affected organ (Gouletsou *et al*., 2003).

The post-mortem assessment of the affected genital organs may be also explored by an histological examination to assess the degree of their alteration (Hajtos *et al.*, 1987).

Such investigations have not so far been carried out in Algeria. The aim of this clinical study, supplemented by an histopathological examination was to estimate the prevalence of testicular pathologies in rams of this Algerian breed and raise macroscopic and histopathological changes of these organs.

MATERIALS AND METHODS

The area of study which is located in the west of Algeria is very important from the economic point of view, representing a road crossing between the north and south. This region has a sheep population estimated at about one million head.

Two thousand seven hundred and fifty rams of the Algerian Rembi breed of different ages were examined at Tiaret slaughterhouse (West Algeria) during one year (2007). The animals come from many localities in the region where they are usually conducted in semi-extensive farming. The age of these animals was determined by examination of the incisors and according to information provided by their owners. The observations were made by the same person throughout the year at a frequency of twice a week. For each daily observation, all slaughtered rams were checked for the condition of their testes and epididymides by a careful inspection and palpation of all parts of these organs. Because of the difficulty to clinically differentiate between the hypoplasia and testicular atrophy (Watt, 1978; Burgess, 1983), these two lesions were considered as unique. The size of hypoplasic testes was compared to that of contra lateral testis or with testes of normal animals of similar age. The various pathologies identified were classified according to certain criteria to find the type of pathology, its prevalence and the type of lesion (unilateral or bilateral). In parallel to the macroscopic study, an histological follow-up was conducted on 195 testes and epididymis affected with different types of lesions as cryptorchidism, orchitis and epididymitis and compared to those belonging to normal animals of the same age. Fragments of these affected testis and epididymis were fixed and preserved for 48 h in a solution of formalin 10%. The samples are then passed through an alcohol bath at 70%. They were then passed in a paraffin bath. After that, they were dewaxed in xylene and dehydrated in increasing concentrations of alcohol. Histological sections of 5 μm thin were performed and then stained with hematoxylin-eosin, to be subsequently analyzed.

The association between the age group of rams and the presence of abnormalities was evaluated by chi square test. This test was also used to compare the proportion of unilateral and bilateral abnormalities.

RESULTS

Among the 2750 rams examined at Tiaret slaughterhouse, 195 (7% of the total genital tracts examined), were affected (Table 1). Cryptorchidism was observed in 4% of cases and represented 55% of all diseases recorded so it is regarded as the most frequent abnormality in our study. It is followed by hypoplasia/atrophy (3% of cases), orchitis and epididymis (0.5% of cases). The proportion of bilateral cryptorchidism (62%) was significantly higher ($p<0.001$) than 38% in the unilateral one (Table 1).

All identified cases of cryptorchidism were found in the testes located in the abdominal region where the cryptorchid testicle is always smaller and firmer than the normal. Compared to the testes

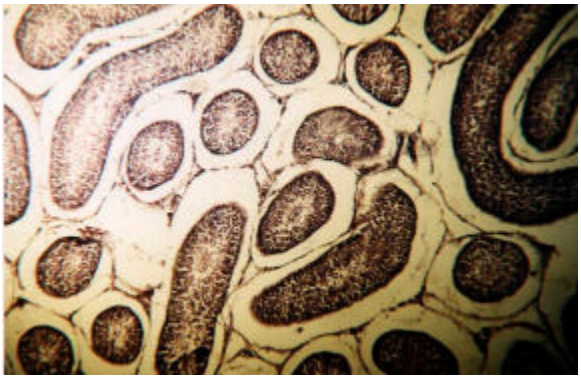

Fig. 1: Histological section at a seminiferous tubule of a testis of a Rembi ram (Hematoxylin-eosin ×400). Interpretation: Seminiferous tubes filled with spermatozoa showing a strong spermatogenetic activity

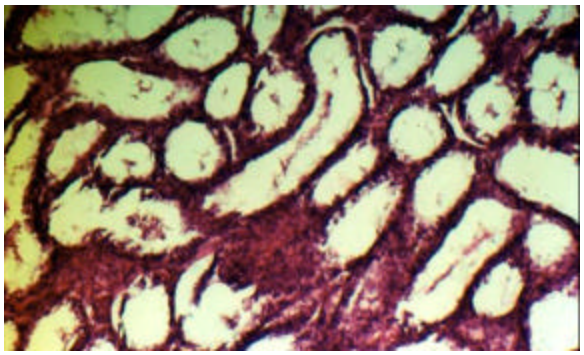

Fig. 2: Histological section of a testicle in a cryptorchid Rembi ram (Hematoxylin-eosin ×500). Interpretation: seminiferous tubes reduced in diameter and showing a poor spermatogenetic activity

Table 1: Incidence of testicular abnormalities in Rembi rams at slaughter.

Abnormalities	Unilateral cases (%)	Bilateral cases (%)	Global (%)
Cryptorchid	41 (38)	67 (62)	108 (4^a;55^b)
Hypoplasia/Atrophy	29 (40)	44 (60)	73 (3^a;37^b)
Orchitis and epididymitis	6 (43)	8 (57)	14 (0.5^a;7^b)
All Abnormalities	76	119	195 (7^a;100^b)

[a]: Percentage of each anomaly in relation to the total number of examined animals (n = 2750). [b]: Percentage of each anomaly in relation to the total number of anomalies (n = 195)

of normal animals (Fig. 1), histological examination of fragments of cryptorchid testes (n = 108) showed a decrease in the seminiferous tubules diameter. Spermatogenic cells, of small size, are formed by a seminal epithelium composed with a single layer of Sertoli cells (Fig. 2).

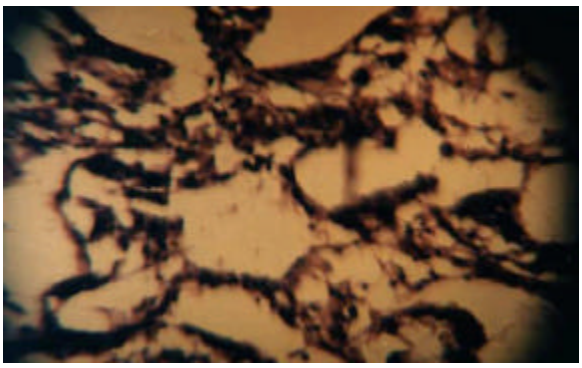

Fig. 3: Histological section of a testicle with an orchitis, in a Rembi ram (Hematoxylin-eosin x200). Interpretation: Extensive destruction of the histological structure of the seminiferous tubules

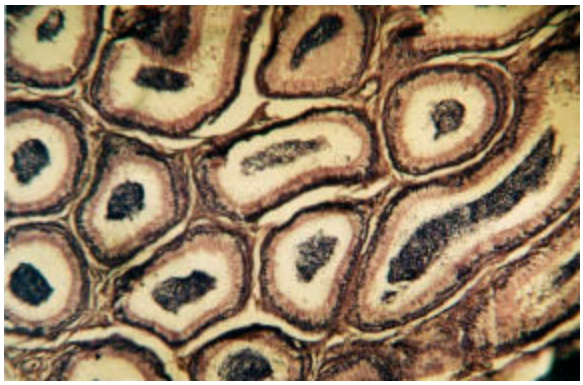

Fig. 4: Histological section of a healthy epididymis in a Rembi ram (Hematoxylin-eosin x200). Interpretations: Epididymal channels showing a high spermatogenetic activity

Among cases of hypoplasia/atrophy (Table 1), the proportion of bilateral disease (60%) was significantly more frequent ($p<0.001$) compared with unilateral disease (40%).

Compared to the testes of normal animals of similar age, hypoplastic testes are smaller with a smooth wall.

In over 70% among a total of 14 orchitis cases (Table 1), hypertrophy and congestion have affected both the testis and epididymitis in which the proportion of bilateral disease (57%) was significantly higher ($p<0.01$) compared with the unilateral involvement (43%).

Macroscopic examination also showed adhesions between the tunica albuginea and vaginalis. Compared to normal subjects (Fig. 1), the 14 samples of orchitis and epididymitis showed a profound alteration and destruction of tubules, resulting in a significant loss of their histological structure and an absence of spermatogenetic lineage (Fig. 3). In comparison to healthy epididymides (Fig. 4), cases of epididymitis also showed an extensive destruction of the histological structure of the epididymal wall, with a loss of its basal and glandular cells (Fig. 5).

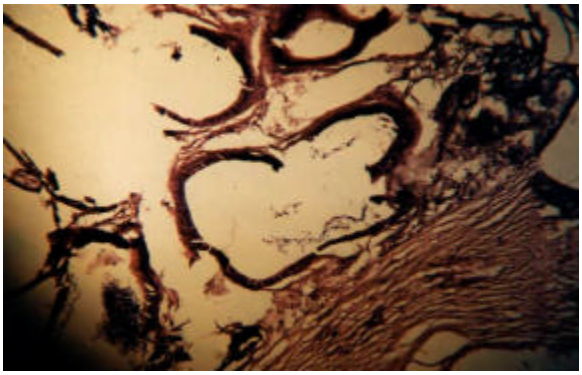

Fig. 5: Histological section of a case of epididymitis in a Rembi ram (Hematoxylin-eosin x200). Interpretation: Extensive destruction of the histological structure of the epididymis

DISCUSSION

The ram has often been the subject of several clinical works (Kiyma *et al*., 2000; Siddiqui *et al*., 2005; Arman *et al*., 2006). However, few studies have been made at the slaughterhouse, except those made in Australia on Merino rams (Watt, 1978). Other studies have been made recently by Alosta *et al*. (1998) in Ireland and Regassa *et al*. (2003) in Ethiopia on rams of different breeds.

Whatever the place of study, the prevalence of genital pathologies of rams of different breeds varies between 9 and 20%. In our study, the prevalence of genital pathologies (7%) is closer to the frequency range reported by previous authors. Nevertheless, our results focused only on the macroscopic identification of diseases of the testes and epididymis while the other works have addressed the entire genital tract.

Macroscopically, reduced volume of testes associated with cryptorchid cases is similar to what has been reported by Burgess (1983). Histologically, the lesions made by both the tubule and interstitial tissue are similar to those reported during experimental cryptorchidism by Amann and Veeramachaneni (2007) which confirmed the alteration of the two compartments of the testis.

The macroscopic and histological changes in cryptorchid testes are more intense in older cases and more for abdominal location (Barenton *et al*., 1982). It is the excess of temperature at which the ectopic testis is subject which is responsible for impaired spermatogenesis (Setchell, 2008). Moreover, this feature is variable and may even be normal in case of monorchidie (Regassa *et al*., 2003).

For cases of testicular enlargement, a traumatic origin may be suspected in the first place given the type of farming (semi-extensive) applied in this region and its implications for reproductive management of the ram (Boulkaboul and Moulaye, 2006). An infectious origin with brucella can probably also be suspected, because the majority of orchitis cases were involved with an enlarged epididymis, especially the tail (in 70% of cases). In addition, in recent years, several cases of brucellosis in different animal species have been detected in Algeria (Aggad and Boukraa, 2006). In Australia, Burgess (1983) reported in his study on Merino sheep bred, that 5% of orchitis were of brucella origin. Such gross and histological changes were described during clinical examination and ultrasound (Jansen, 1983; Hajtos *et al*., 1987; Gouletsou *et al*., 2003).

They were confirmed by histopathology (De la Puente-Redondo *et al*., 2000; Chand *et al*., 2002), where often the germ of Brucella was isolated from testes and epididymides of achieved rams. Consequently, the origin of such a brucella infection can not be based solely on clinical and histopathological examination (Burgess and Norris, 1982; Hajtos *et al*., 1987). It is therefore necessary to resort to bacteriological examination for the isolation of this germ.

CONCLUSION

The low rate of genital pathologies observed in this study may be overstated, given that the slaughterhouse is a place of concentration of all reported clinical diseases.

The histological exploration of ram's genital tracts is a further examination in the diagnosis of male fertility. It can therefore be stated on the nature of the characteristic lesions of each disorder and the degree of impairment of the body reaches out and consequently the impact of these diseases on the reproductive potential of the ram. Nevertheless, such investigations must be followed in future by bacteriological tests to determine the causative agent of infection. This will allow us to draw a subsequent program of prevention and treatment against diseases prevailing identified in the large farms of sheep.

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