

**Pathological Study of the Thyroidectomy on Testes of Rabbit****Mosa Fadiel Abbas**

Department of Surgery &amp; Obstetric, College of Veterinary Medicine, University of Basrah, Iraq

\*Corresponding author; [mosafadiel@yahoo.com](mailto:mosafadiel@yahoo.com)Doi: <https://doi.org/10.37940/AJVS.2020.13.2.6>

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<http://creativecommons.org/licenses/by/4.0/>.**Abstract**

The current study was conducted on fifteen adult male rabbits (2-3 kg), divided into 3 equal groups (control group, group A 'seven days' & group B 'fourteen days group'), removing of the testes and thyroidectomy have been made to both A and B groups. Results indicated that several clear histopathological changes have been observed in the testicular tissues including, complete suppression of spermatogenesis with vacuolar degeneration of epithelial lining of seminiferous tubules in both groups. Moreover, a multinucleated giant cell spermatid in the lumen of seminiferous tubules was featured with no sperm was detected in the lumen of group B. It has been concluded, that the thyroidectomy can cause serious effects on male sexual organs due to diminishing of sex hormones responsible to it growth.

**Keywords:** Thyroidectomy, Spermatogenesis, Pathology.

دراسة نسجية مرضية لتأثير إزالة الغدة الدرقية على الخصى في الارانب

## الخلاصة

أجريت الدراسة الحالية على خمسة عشر أرنباً بالغاً (2-3 كغم)، مقسمة الى ثلاثة مجموعات متساوية (مجموعة السيطرة، المجموعة أ "سبعة أيام" والمجموعة ب " أربعة عشر يوماً")، وتم إزالة الخصيتين واستئصال الغدة الدرقية لكل من المجموعتين أ و ب. أشارت النتائج إلى أنه قد لوحظت العديد من التغيرات النسيجية المرضية الواضحة في أنسجة الخصية، بما في ذلك، قمع كامل لتكوين الحيوانات المنوية مع تنكس فجوي للبطانة الظهارية للأنايب المنوية في كلا المجموعتين. علاوة على ذلك، ظهرت خلية منوية عملاقة متعددة النوى في تجويف الأنايب المنوية مع عدم وجود حيوانات منوية في تجويف المجموعة ب. وقد استنتج أن استئصال الغدة الدرقية يمكن أن يسبب آثاراً خطيرة على الأعضاء التناسلية الذكرية بسبب تناقص الهرمونات الجنسية المسؤولة عن النمو.

**Introduction**

The testes are essential sex organs, the main function is not only the production of male gametes but also synthesis and controlled liberation of the androgen (testosterone) (1). Androgen plays

Thyroid hormone plays a critical role in coordinating, advancement, differentiation, and metabolism in multiple organs. The testis was regarded as a thyroid hormone not responsive organ for last to decades, however, recently recorded investigations have confirmed the being of thyroid hormone functional receptors (TRs) in the testis (4). The study results reveal that thyroid hormones play a critical role in sexual organ

function. Studies have testified that (T3) is one of the thyroid hormones that regulate Sertoli cell proliferation and differentiation amid testis advancement including the assembly of the blood-testis barrier (5). Besides, (T3) stimulates Leydig cell differentiation and stimulates steroidogenesis in the testis (6). The main goal of the current study was to clarify the effect of thyroidectomy on spermatogenesis in male rabbits.

### Materials and Methods

Fifteen adult male rabbits, weighing between 2-3 kg were used in the current study. All animals are clinically healthy and kept in cages at the animal house, College of Veterinary Medicine, University of Basrah, Iraq. Food & water were given during the adaptation period for 2 weeks. The rabbits were divided randomly into 3 groups, five animals for each

**Control group:** Five male rabbits used as shame groups. (Only a surgical incision of the skin as a negative control group).

**Group A:** Five male rabbits were complete thyroidectomy and sacrifice after 7 days then testes removed for pathological study.

**Group B:** Five male rabbit were complete thyroidectomy and sacrifice after 14 days then testes removed for pathological study.

### Surgical operation:

#### A- Thyroidectomy:

The intramuscular injection of a mixture of 35 mg/kg of Ketamine hydrochloride (Fresenius Kabi manufacturing), five mg/kg of Xylazine hydrochloride (livestock pharma) (7). After anesthesia, an incision of 3-5cm was made through the skin at the midline of the ventral aspect of the neck and make blind dissection of the muscle gently (**Fig.1**), thyroid blood vessels were cut and ligated with catgut (4.0) (**Hamburg GmbH**) after that two lobes of the thyroid gland was removed (**Fig. 2**). Finally, Procedures done

with antiseptic technique, an antibiotic powder (Penicillin-Streptomycin Diamant, Diamant Laboratories, Paris, France) was applied betwixt the trachea and muscle tissues. The skin was then closed with silk suture and an antiseptic lotion (Betadine; Asta Medica, Merignac, France) was applied externally to prevent local infection.



Fig 2: Removal of Thyroid gland lobes

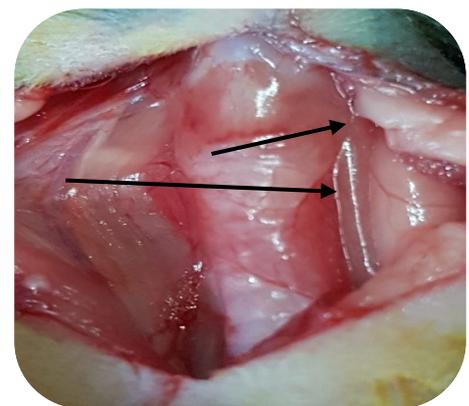


Fig 1: Thyroid gland

B- Testes removing :

This surgical operation to remove testes for the pathological study was done according to (8).

### Results and discussion

After thyroidectomy, the result of this study showed several histopathological changes on testicular tissues, however, the results were explained according to the periods after thyroidectomy as below:

Control group:

The control group showed normal architecture of seminiferous tubules and composition of all stages of spermatogenesis in the lumen of seminiferous tubules (Fig.3). Histological section of the epididymis of the control group

showed normal architecture of epididymis with normal ciliated, cuboidal cells lining, and their lumen filled with sperms (Fig 4)

Group A:

After seven days of thyroidectomy, the testes are removed for histopathological examination, the testes show marked suppression of spermatogenesis, moreover, the vacuolar degeneration of epithelial lining of seminiferous tubules was also indicated (Fig.5). On the other hand, a histological section shows fewer numbers of sperms in the lumen of the epididymis after seven days of thyroidectomy (Fig.6).

Group B :

In this group, five animals were testes removed after fourteen days of thyroidectomy, and the histopathological picture show, several changes in its tissues were indicated as complete suppression of spermatogenesis, Furthermore, vacuolar degeneration of epithelial lining of seminiferous tubules was also noted, in addition to these changes there are a multinucleated giant cells spermatids in the lumen of seminiferous

tubules was featured (Fig.7). Moreover, In (Fig.8) the histopathological section of epididymis was showed there are no sperm in the lumen, also there are spermatids in the lumen.

The histopathological results indicated a marked suppression of spermatogenesis of seminiferous tubules in 7 days and 14 days of the experiment, that may as a result of the thyroidectomy which leads to inhibit the spermatogenesis due to lack in T3 hormone these findings was agreed with (9) who mentioned that the thyroidectomy was resulted in inhibition of gametogenesis and reflected a widespread regression of spermatogenic cells. Furthermore, the current study showed that the depletion of seminiferous tubules parenchyma that may due to diminished in T4 hormones as a result to thyroidectomy, these ideas was in partial agreement with (10) Whose indicated that the delay in germ cell maturation and increase degeneration may due to low FSH and T4 levels in hypothyroid animals.

Experimental rabbits show vacuolar degeneration of seminiferous tubules in 7 days and 14 days, which might occur due to the diminished levels of T4 in current experiment animals, this diminished in T4 leading to an inhibitory effect on Sertoli cells and other seminiferous tubules tissue, these results were in an agreement with (10) whom, suggested that thyroid hormones have a notable effect on seminiferous tubules in both adult and immature rats, which caused lasting reduce in seminiferous tubules due to degenerative changes in spermatogenic cells in thyroidectomized rats. Also, it's known that the deficiency of thyroid hormones results in reducing the level of GH and FSH thus, this reduced levels of these hormones could also give the excess to the histopathological change in seminiferous tubules detected in the current study. Furthermore, the current results showed a present of spermatids in the lumen of seminiferous tubules of 14 days group that indicate the occurrence of severe degenerative vacuolar changes that may be leading to fusing

many single spermatids to form a spermatid giant cells, this idea may inconsistent with (11) who found that a present of giant cell in a male B6C3F1 mouse from a subchronic study, which

referred to its presence as a result of germ cells degeneration.

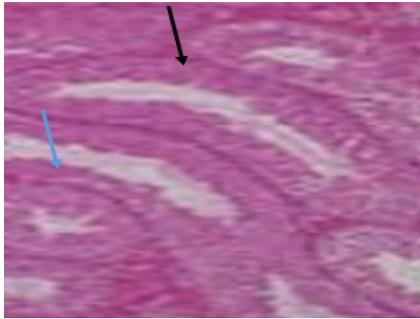


Figure (3): Histological section of testis of control group show normal architecture of seminiferous tubules (black arrow), normal composition of all stages of spermatogenesis in the lumen of seminiferous tubules (blue arrow). H&E stain. 10X.

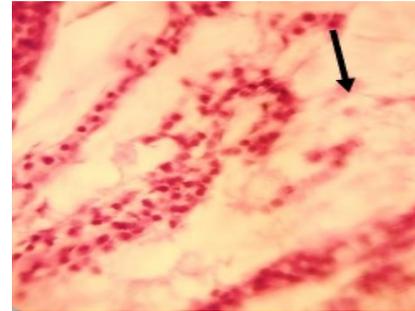


Figure (6): Histological section of epididymis of 7 days group show fewer numbers of sperms in the lumen (black arrow). H&E stain. 10X.



Figure (4): Histological section of epididymis of control group show normal architecture of epididymis (black arrow), with normal ciliated, cuboidal cells lining (blue arrow), and their lumen filled with sperms (green arrow) H&E stain. 40X.

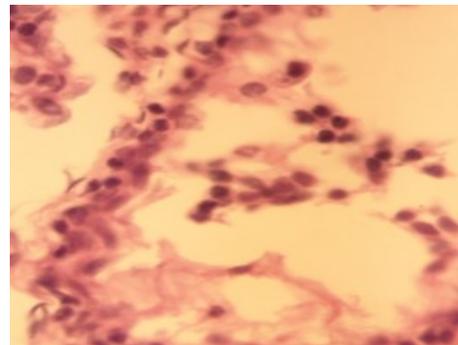


Figure (7): Histopathological section of testes of 14 days group show complete suppression of spermatogenesis (black arrow), with vacuolar degeneration of seminiferous tubules epithelial lining (red arrow), and a spermatids in the lumen of seminiferous tubules (green arrow). H&E stain. 40X

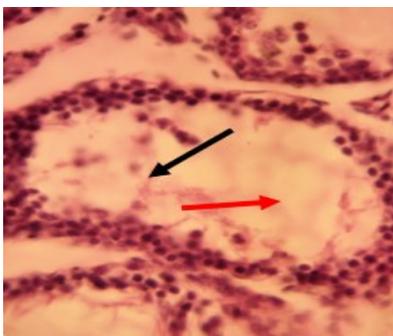


Figure (5): Histopathological section of testes of 7 days group show marked area of suppression of spermatogenesis (black arrow), Moreover, vacuolar degeneration of seminiferous tubules epithelial lining was also indicated (red arrow). H&E stain. 10X.

H&E stain. 40X

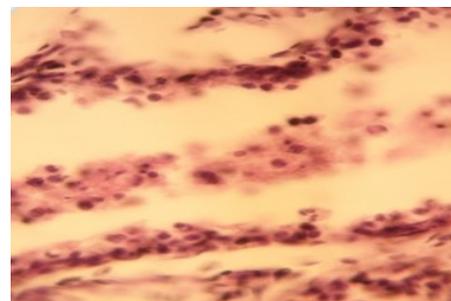


Figure (8): Histopathological section of epididymis of 14 days group show no sperm in the lumen (black arrow), with a spermatids in the lumen (red arrow). H&E stain. 10X

### Conclusions

It has been concluded that thyroidectomy can cause serious effects on male sexual organs due to the diminishing of sex hormones responsible for its growth.

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