

**Ministry of Higher Education and  
Scientific Research    University of Al-Qadisiyah    College of  
Veterinary Medicine**



**Morphology & histology study of  
Tonsils**



A research  
Submitted to the Council of the College of Veterinary Medicine/  
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Requirements for the Degree of PH. of Science in Veterinary  
Medicine Sciences

**By**

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2018 AD

1439 AH

## **Certificate of supervisor**

I certify that **Karar Younis Ja'far** have completed the fulfillment of their graduation project entitled **Morphology&histology study of Tonsiles** for the year 2017-2018 /  
under my construction .

**supervisor**

Lect. Eman Ibraheem Daly

March 2018

## **Certificate of instructor**

We certify that **Karar Younis Ja'far** have completed the fulfillment of their graduation project entitled for th **Morphology&histology studyof Tonsiles** year 2017-2018 / under my construction .

## **Instructor**

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**Head of Department of Internal and Preventive Medicine**

**Lecturer. Dr. Muthanna Hadi Hussain**

March 2018

## **DEDICATION**

Dedicate this search to

To whom words can not die

To those who can not count their virtues

To my dear parents, God has given them to me

To my brothers and sisters ...

To my love... Israa Salem

## **AKNOWLEDGEMENTS**

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## INTRODUCTION

In humans and most animals there are several types of tonsils which are pharyngeal tonsil, paired tubal tonsils, paired palatine tonsils, lingual tonsils, paraepiglottic tonsil and tonsils of the soft palate (1). Indeed in ruminants, tonsils represent an important component of the respiratory tract associated lymphoid tissue (2),(3), share morphological and functional characteristics of mucosa associated lymphoid tissue (4). Unlike lymph nodes, tonsils do not possess afferent lymphatic vessels (5). In cattle, tonsils play an important role in diseases such as bovine viral diarrhoea (6), and *Mannheimia haemolytica*-induced pneumonia (7), where tonsils serve as a site of colonization. In bovine tuberculosis (8), tonsils play an important role in the development of the immune system. Completion of tonsils is achieved after birth under the influence of antigens. The embryologic development of tonsils appears to be the same as that of the thymus gland (9).

## Function

The major function of tonsils is local immunity relating to palatine tonsil B cells can mature to produce all the five major Immunoglobulin (Ig, I<sub>b</sub>) classes.(4,5) Furthermore, when incubated in vitro with either mitogens or specific antigens, they produce specific antibodies against diphtheria toxoid, poliovirus, *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Staphylococcus aureus*, and the lipopolysaccharide of *E. coli*. Most Immunoglobulin A produced by tonsillar B cells(1,7)

In addition to humoral immunity elicited by tonsillar and adenoidal B cells following antigenic stimulation, there is considerable T-cell response in palatine tonsils. Thus, natural infection or intranasal immunization with live, attenuated rubella virus vaccine has been reported to prime tonsillar lymphocytes much better than subcutaneous vaccination. Also, natural infection with varicella zoster virus has been found to stimulate tonsillar

lymphocytes better than lymphocytes from peripheral blood.(2,3,4)

## Embryonic development

The tonsils begin developing early in the third month of fetal life. They arise from the endoderm lining, the second pharyngeal pouch, and the mesoderm of the second pharyngeal membrane and adjacent regions of the first and second arches. The epithelium of the second pouch proliferates to form solid endodermal buds, growing into the underlying mesoderm; these buds give rise to tonsillar stroma. Central cells of the buds later die and slough, converting the solid buds into hollow tonsillar crypts, which are infiltrated by lymphoid tissue. (10)

Both right and left tonsils form part of the circumpharyngeal lymphoid ring. The size of the tonsil varies according to the age, individuality, and pathologic status. At the fifth or sixth year of life, the tonsils rapidly increase in size, reaching their maximum size at puberty, in which the tonsils measure ( 20-25) mm in vertical and 10-15 mm in transverse diameters.(11)

## Antomy of Tonsiles

### A.sites

lies in a definitely triangular space, bounded by the two pillars of the face and the tongue. As it entirely fills this space during most of life, The exposed pharyngeal surface of the tonsiles varies so it is hardly possible to represent it; but it is nearly always possible to distinguish the remains of



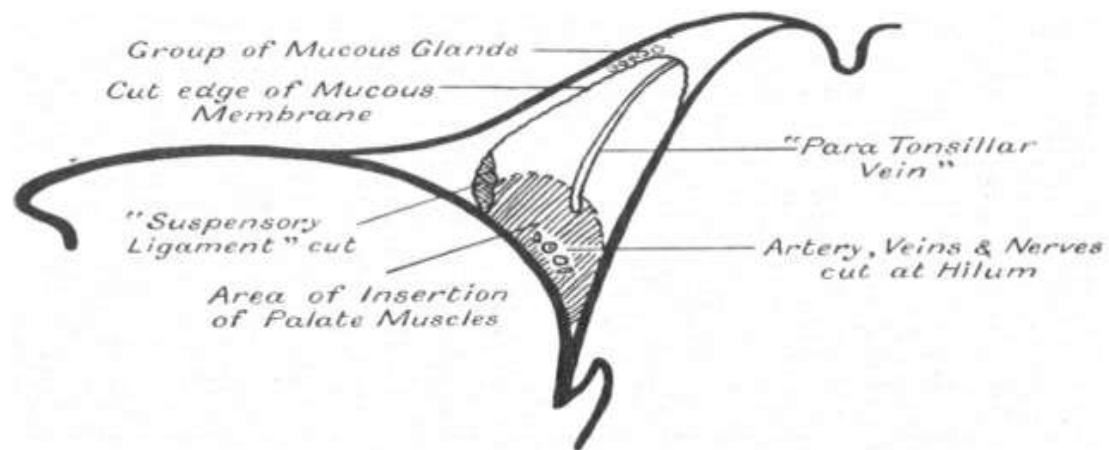
the original diverticulum from which it developed. This is usually called by the obviously inaccurate name of the supra- tonsillar fossa(7). The Surgical Anatomy of the Tonsil though, its slit-like shape, with its long axis parallel to the lingual border of the tonsillar fossa, On the lateral surface, the tonsil has a thin distinct capsule, which is formed from condensation of pharyngobasilar fascia. This fascia extends into the tonsil itself, forming septa, which allow passage of nerves and vessels. (12)

Deep to the pharyngobasilar fascia, in the upper part of the fossa, is the superior constrictor ; below it is the styloglossus passing forward into the tongue. The buccopharyngeal fascia is situated lateral to the superior constrictor . The glossopharyngeal nerve and stylohyoid ligament pass obliquely downward and forwards beneath the lower edge of the superior constrictor in the lower part of the tonsillar fossa. The paratonsillar vein descends from the soft palate across the lateral aspect of the capsule of the tonsil before piercing the pharyngeal wall to join the pharyngeal plexus. (13)

The medial free surface projects into the oropharynx and is covered by a thin layer of stratified squamous epithelium, which extends from the surface deep into the tonsil, forming crypts. (14)The medial surface has a pitted appearance; each tonsil has 10-20 pits. The openings of the crypts are fissurelike, and the walls of the crypt lumina are collapsed and in contact with each other.(15)

The mouth of the supratonsillar fossa (intratonsillar cleft) opens in the upper part of the medial surface of the tonsil. The mouth of the cleft is semilunar, curving parallel to the convex dorsum of the tongue in the parasagittal plane.(16)It is thought to represent a persistent part of the ventral portion of the second pharyngeal pouch. (17)

A triangular fold of mucus membrane is present during fetal life, extending from the lower part of the palatoglossal fold to the anteroinferior part of the tonsil. During childhood, this fold is invaded by lymphoid tissue and is incorporated into the tonsil. A semilunar fold of mucus membrane is present between the palatopharyngeal arch and the upper pole of the tonsil. This fold separates the upper pole of the tonsil from the base of the uvula. A tonsillolinguual sulcus separates the tonsils from the base of the tongue.(18



Diagram(1) of surrounding of tonsils after its removal

## **B.Blood y supply**

the tonsil is supplied like an ordinary lymphatic gland, from a single artery entering a definite hilum, from which the veins emerge. In this case the hilum is always in the lower part of the buried surface close to the

tongue

the artery is the tonsillar branch of the facial artery. The other tonsillar arteries ramify in the muscles and mucous membrane round about, but do not pierce the capsule. There are usually two veins, which run out from the hilum through the superior constrictor close to where the artery passes through it, to end in the common facial trunk. In consequence of this arrangement of the blood vessels the tonsil may be separated over two-thirds of its buried surface during tonsillectomy with loss of only a few drops of blood.

### **1.arterial**

The arterial supply of the adenoid is derived from the following arteries:

1. Ascending pharyngeal artery
2. Ascending palatine artery
3. Tonsillar branch of the facial artery
4. Pharyngeal branch of the maxillary artery
5. Artery of the pterygoid canal
6. Basisphenoid artery

### **2.Nerve Supply**

Nerves of the tonsil The glossopharyngeal nerve , The nerves supplying the palatine tonsils come from the maxillary division of the trigeminal nerve via the lesser palatine nerves, and from the tonsillar branches of the glossopharyngeal nerve. The glossopharyngeal nerve continues past

the palatine tonsil and innervates the posterior 1/3 of the tongue to provide general and taste sensation. This nerve is most likely to be damaged during a tonsillectomy, which leads to reduced or lost general sensation and taste sensation to the posterior third of the tongue(1,2)

### **3.Venous drain**

Venous blood drains through a peritonsillar plexus. The plexus drains into the lingual and pharyngeal veins, which in turn drain into the internal jugular vein.(13)

### **4.Lymphatic supply**

Tonsils do not possess afferent lymphatics. Efferent lymphatics drain directly to the jugulodigastric nodes and upper deep cervical lymph nodes and indirectly through the retropharyngeal lymph nodes. (19)

## **Microscopic Anatomy**

The tonsil consists of a mass of lymphoid follicles supported by a connective tissue framework. The lymphocytes are dense in the center of each nodule, an area commonly referred to as the germinal center (because multiplication of lymphocytes takes place at this center).(16)

The tonsillar crypts penetrate nearly the whole thickness of the tonsil and distinguish it histologically from other lymphoid organs,(20).The luminal surface of the tonsil is covered with nonkeratinizing stratified squamous epithelium, and it is continuous with that of the remainder of the

oropharynx. (17,18),diagram(2)

The tonsillar surface was generally covered by a pseudostratified columnar, ciliated epithelium accompanied by lower numbers of PAS positive goblet cells. Ciliated epithelium was irregularly interrupted by infiltrates of mononuclear, nonepithelial cells of mostly lymphoid morphology. Extending from the follicle superficially through the epithelial layer (19), (fig.2), lymphoid infiltrates effaced the discontinuous basement membrane, which was especially visible on PAS and Masson's Trichrome stained sections (not shown). Often nonepithelial cells were separated from the tonsillar lumen by only a single layer of attenuated epithelium (20)

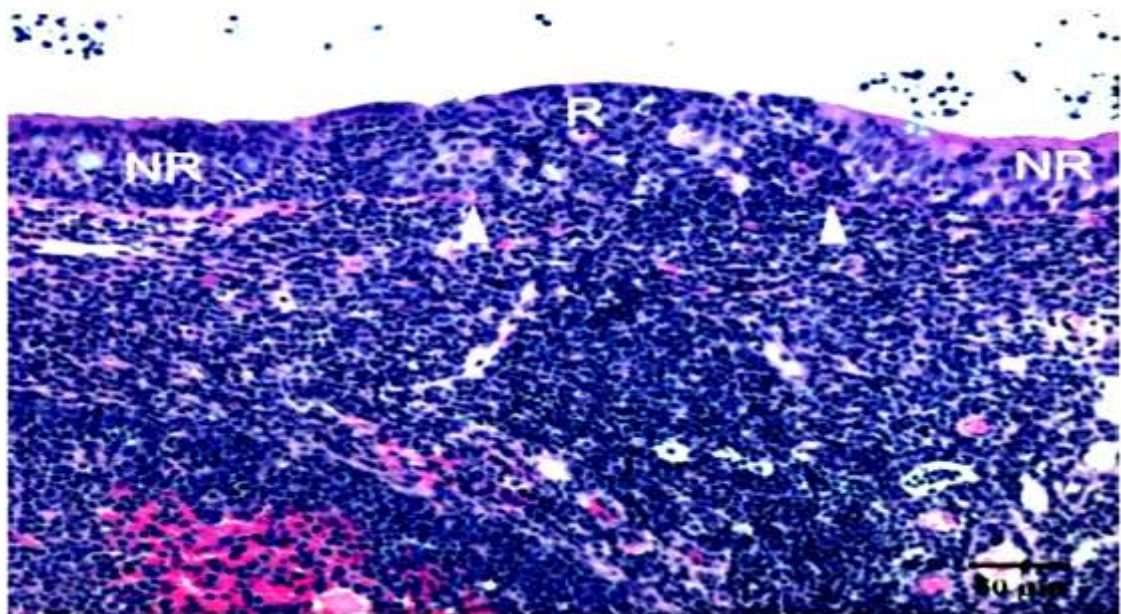


Fig. 1. Section of pharyngeal tonsil from 7-month old calf. region of reticular epithelium (R) between regions of nonreticular epithelium

(NR).H.SE,X40

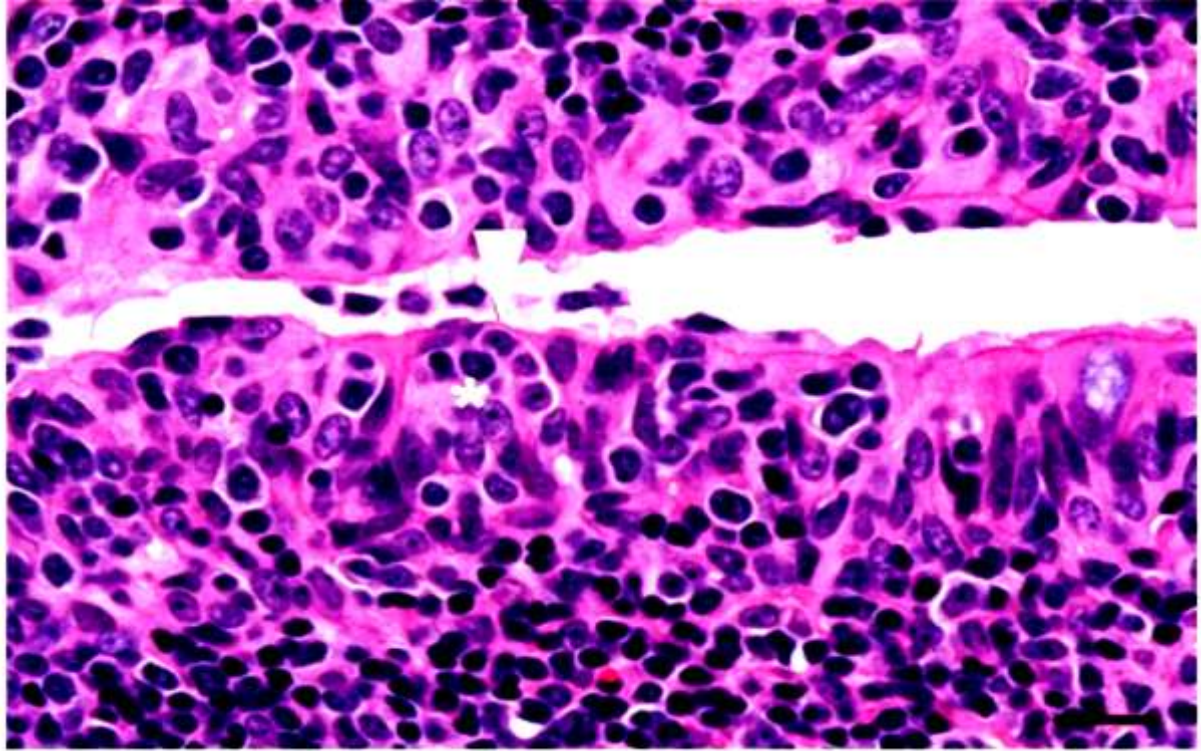
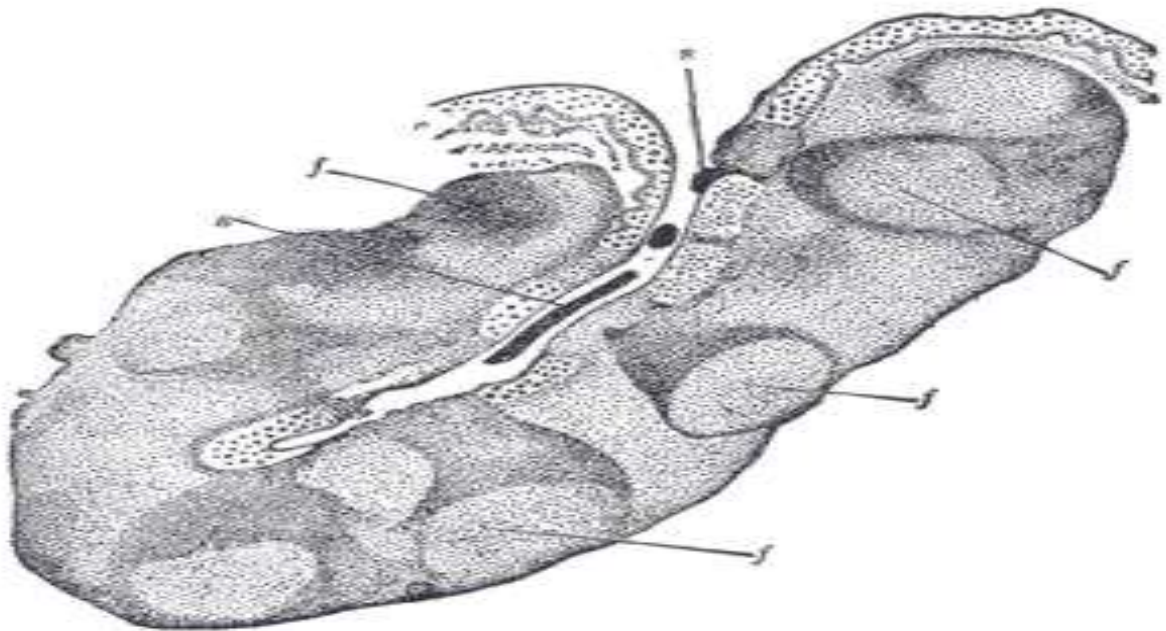


Fig. 2. Section of pharyngeal tonsil from 7-month old calf. nonepithelial cells present individually and in clusters (asterisk), separated from tonsillar lumen by thin strand of cytoplasm .H.&E.X100





Diagram(2)

Low-power microscope magnification of a cross-section through one of the tonsillar crypts (running diagonally) as it opens onto the surface of the throat (at the top). Stratified epithelium (e) covers the throat's surface and continues as a lining of the crypt. Beneath the surface are numerous nodules (f) of lymphoid tissue. Many lymph cells (dark-colored region) pass from the nodules toward the surface and will eventually mix with the saliva as salivary corpuscles (s).

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