

HISTOGENESIS AND MORPHOGENESIS OF HASSALL'S CORPUSCLES IN HUMAN FETUSES: A LIGHT MICROSCOPIC STUDY

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ABSTRACT

Twenty- eight healthy fetuses between 11-40 weeks were selected to study the histological and morphological growth of Hassall's corpuscles. We were found that Hassall's corpuscle appreciated earliest at 14th weeks and seen as two to three cells nest in area having degenerated tissues. Later, as the age of fetus advanced the size and shape of Hassall's corpuscles rapidly increasing by additions of more apoptotic cells and aggregation of reticulo-epithelial cells. Near 28th week these corpuscles showed spurt of growth and initially corpuscles were distant from each other, they started to come together e.g. reducing inter-corpuscular distance. In late stage (near term) these corpuscles fused together giving variable shapes and sizes.

Key word: Hassall's corpuscles, fetus, reticulo-epithelial cells, Apoptosis

INTRODUCTION:

Since the first description by Hassall in 1849 concentric corpuscles were found in medulla of thymic lobule, multiples of studies were attempted to establish the origin and functions of Hassall's corpuscles¹. Several authors had confirmed that these corpuscles were formed by reticulo-epithelial cells of thymic lobule, but several hypothesis had been elaborated by many authors^{2,3,4,5,6}. It was important to mention that most of studies cited in the existing scientific literature from experiments upon guinea pig, rat and other lower animals^{7,8,9,10,11}. These studies had highlighted the existence of differences in mammalian species and ultra-structure of these corpuscles¹². A sequential study was still lacking which elucidate the morphological changes in Hassall's corpuscles at light microscopic level. In this study we had attempted to study above issue.

MATERIAL AND METHODS:

The present study included 28 human fetuses which were collected from museum of department of Anatomy, JNMC Aligarh. We had taken the clearance from institutional ethic committee to study on human fetuses. We had divided these fetuses in two groups before and after 28 weeks based on foot length and Crown-rump length. Each group contained 14 fetuses.

Each fetus was dissected to collect the thymus. Thymuses were processed by paraffin embedding method. Each block of thymus was cut at 10 μ m thick section. These sections were stained with hematoxylin and eosins and Massion's trichome. Each section was studied in low and high power.

RESULT AND DISCUSSION:

Hassall's corpuscles were visible earliest in sections of fourteenth week. Earliest organization of Hassall's corpuscles were represented by collection of degenerated cells and surrounded by hypertrophic reticulo-epithelial cells (Plate 1). These hypertrophic reticulo-epithelial cells did not show tendency of flattening or concentric disposition. This Hassall's corpuscles described as juvenile Hassall's corpuscles by Raica et al². Between 16-20 weeks of fetuses Hassall's corpuscles had reticulo-epithelial cells having tendency to flatten and started to organize in concentric pattern but lacks typical presentation considered as premature Hassall corpuscles as described by Raica (Plate 2). In 20-24 weeks of gestation Hassall's corpuscles showed typical appearance e.g.- concentric arranged reticulo-epithelial cells along with central deposition of keratin material accepted as mature Hassall's corpuscles (Plate 3). The juvenile and pre-mature Hassall's corpuscles were in solid in nature, they did not show space. Mature Hassall's corpuscles might have a space in centre which gave it appearance as cystic or solid. Near 28-32 weeks we found rapid increase in size and numbers of Hassall's corpuscles. Some corpuscles shows large space due to total lysis inside it and considered as advanced Hassall's corpuscles

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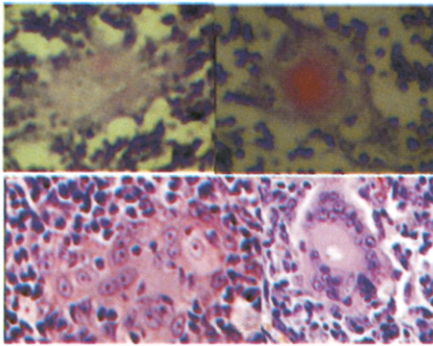


Plate 1.- Juvenile Hassall's corpuscles: by collection of degenerated cells and surrounded by hypertrophic reticulo-epithelial cells. H& E stain (a,b) and Massion trichome (c,d), High power (40X)

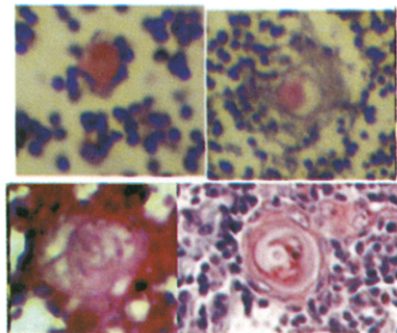


Plate 2.- Premature Hassall's corpuscles: Hassall's corpuscles had reticulo-epithelial cells having tendency to flatten and started to organize in concentric pattern but lacks typical presentation e.g. formation of capsule. H&E stain (a,b,c) and Massion trichome stain (d), High power (40X)

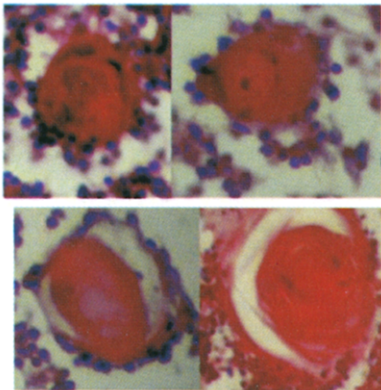


Plate 3. - Mature Hassall's corpuscles: solid or cystic type-- Hassall's corpuscles showed typical appearance e.g. - concentric arranged reticulo-epithelial cells along with central deposition of keratin material accepted as mature Hassall's corpuscles. H&E stains (a,b,c,d), High power (40X).

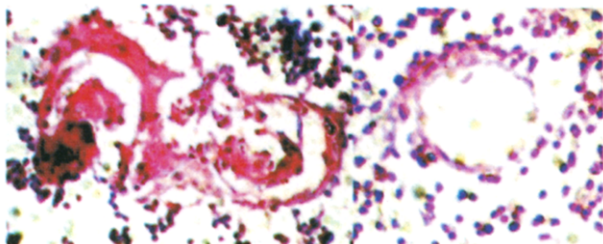


Plate 4. - Advance Hassall's corpuscles: corpuscles shows large space due to total lysis inside it and cystic degeneration. H&E stains (a,b), Higher power (40X).

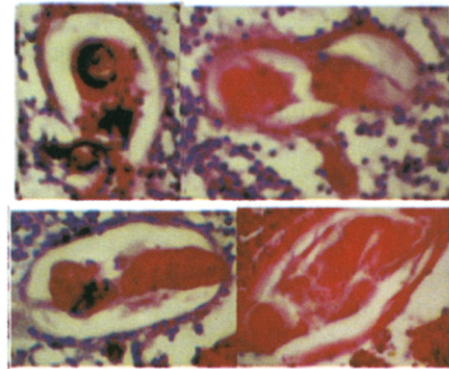


Plate 5. Very Advanced Hassall's corpuscles: Hassall's corpuscles were appeared as compound or conglomerated. Fusion of these corpuscles and collar of reticulo-epithelial cells gave it variable morphology. H&E stains (a,b,c,d), High power (40X).

by Raica et al. The space between two corpuscles was rapidly decreasing. Reticulo-epithelial cells surrounding Hassall's corpuscles started to make collar like to incorporate two or more Hassall's corpuscles. Now these corpuscles were appeared as compound or conglomerated. Fusion of these corpuscles and collar of reticulo-epithelial cells gave it variable morphology like- bell shape, comet shaped, club shaped, lenticular appearance, and so, many intermediary shapes from spherical to deformed shape. These spherical to deformed conglomerated corpuscles were rapidly increasing near term fetuses. Diameters and numbers of Hassall's corpuscle were increasing continuously with a spurt near 28th weeks. Above described morphologically different corpuscles were found in all sections after 20th weeks in variable proportion but showed good picture of attaining maturity with age in terms of shape, size, and degeneration. This type of large, variable shape of corpuscles did not fit to advanced form as described by Raica but it should be called as very advanced stage which was only seen term fetuses not in early fetal life.

CONCLUSIONS:

We have found that Hassall's corpuscle appreciated earliest at 14th weeks and seen as two to three cells nest in area having degenerated tissues. Later, as the age of fetus advanced the size and shape of Hassall's corpuscles rapidly increasing by additions of more apoptotic cells and aggregation of reticulo-epithelial cells. Near 28th week these corpuscles showed spurt of growth and initially corpuscles were distant from each other, they started to come together e.g.

reducing inter-corporcular distance. In late stage (near term) these corpuscles fused together giving variable shapes and sizes. In term fetuses, alteration of shape of Hassall's corpuscles occurred due to fusion of two or more Hassall's corpuscles and collar of epithelial cells. Collection of reticulo-epithelial cells and addition of layers of epithelial cells advised that Hassall's corpuscles were derived from reticulo-epithelial cells.

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