

## Ganglion Cells of the Myenteric Plexus in Human Vermiform Appendix

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### Abstract

The intramural ganglionic plexus of the appendix differs from that of the rest of the intestine in that instead of the nerve cells being clearly stratified into distinct plexuses, they are arranged in an apparently irregular pattern within the muscle layers. In general, stimulation of the myenteric plexus increases the motor activity of the gut by increasing tone & rate of rhythmic contractions along the tract which is required to expel the contents distally. The pathogenesis of appendicitis remains poorly understood. While studying the slides of normal and inflamed appendix specimens presence of prominent ganglion cells in larger number of chronic appendicitis cases and hyperplastic epithelium was observed in few of the cases. An attempt is made to correlate these findings.

**Key words:** Myenteric plexes, Ganglion cells, Hyperplastic Epithelium

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### Introduction

The entire GIT is provided with autonomic innervation comprises of mainly two components Extrinsic & Intrinsic. Both the components are formed by Parasympathetic & Sympathetic nerves. The Preganglionic Parasympathetic fibers entering the colon form synapse in ganglia clustered in the muscle coat - Myenteric plexus of Auerbach's and within the submucosa - Plexus of Meissner's. In general, stimulation of the myenteric plexus increases the motor activity of the gut by increasing tone & rate of rhythmic contractions along the tract which is required to expel the contents distally. Acute

appendicitis is the most common general surgical emergency, and obstruction of the appendiceal lumen with some contents seems to be essential for developing an appendiceal infection. Ganglion cells of the myenteric plexus reach the colon in the seventh week and innervations appear to be complete by the twelfth week of intra uterine life.

Aim is to study the Ganglion cells in the muscle coat of appendix of histologically normal and in its inflammatory conditions.

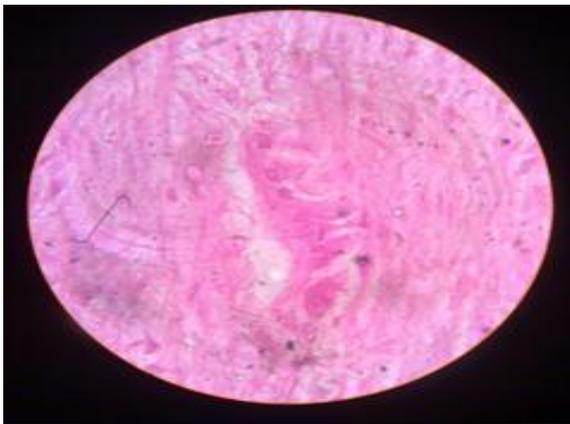
### Materials & Methods

1. Slides of Biopsy specimens from the department of pathology of SSSMC&RI & MGMC&RI over a period of one year (167 specimens) processed for paraffin section and H&E stain were utilized
2. Slides were reported based on the inflammation as chronic, acute and acute on chronic cases.
3. Slides showing prominent ganglionic cells in the muscle coat were picked up.
4. Slides showing prominent ganglionic cells in the wall of the appendix showing any inflammation of obstructive origin due to faecolith and eosinophilic infiltration either due to worm infestation or food allergy were considered for study.

5. Ganglionic cells in the normal appendix specimens were seen for comparing with inflammatory conditions.

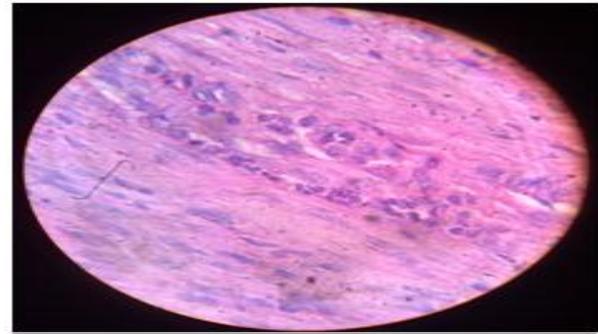
## Results

We observed 167 slides of appendix specimens in which chronic formed 112 cases, 44 cases were acute and 10 cases were acute on chronic . Out of 112 cases of chronic appendicitis 47 specimens (42%) showed prominent ganglion cells Out of 44 cases of acute appendicitis 11 specimens showed prominent ganglion cells (25%). Out of 10 cases of acute on chronic 3 specimens (30%) showed prominent ganglion cells. Of the 47 chronic appendicitis specimens in 35 cases (75%) lumen was filled with faecolith Of the 11 acute appendicitis specimens in 4 cases (36.3%) faecolith was present and in 3 of the acute on chronic appendicitis specimens one case had faecolith.

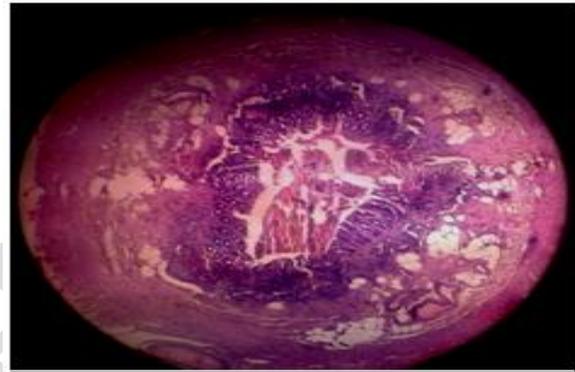


**Fig no 1:** Presence of Ganglion cells in normal appendix (100x)

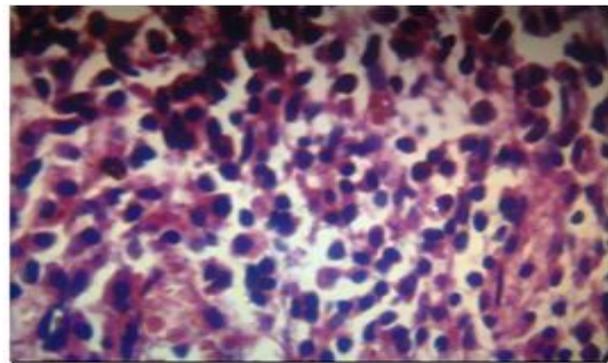
In a total of 167 specimens 61 cases showed prominent ganglionic cells compared to normal appendix (Fig.1) Out of 61 cases lumen is obliterated by the faecolith. (Fig.2) in 40 specimens (.65.5%), and 9 cases showed eosinophilic infiltration in the wall of the appendix (FIG-3) probably due to worm infestation or food allergy. 19 cases(31.1%) showed hyperplastic epithelium(Fig-4) in that 14 cases belong to chronic inflammation and 5 belongs to acute inflammation.



**Fig no 2:** Presence of Ganglion cells in chronic appendicitis (100x)



**Fig no 3:** Presence of fecolith in the lumen of appendix (4x)



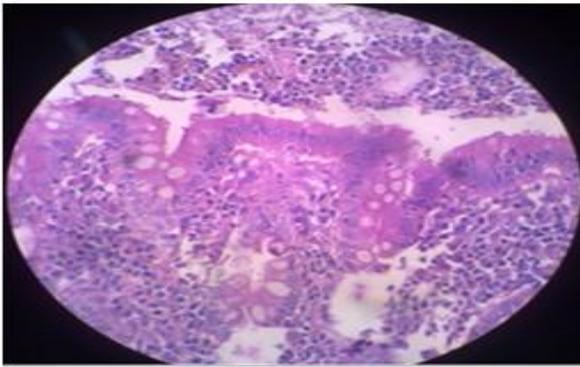
**Fig no 4:** Presence of eosinophilic infiltration in the wall of the appendix (100X)

## Discussion

In general, stimulation of the Myenteric plexus increases the motor activity of the gut by increasing tone & rate of rhythmic contractions (peristaltic movements) along the tract which is required to expel the contents distally. In our present study out of 167 cases appendicitis 61 cases showed prominent ganglionic cells (hypertrophy was observed in the muscularis externa of inflamed appendix specimens). The neuronal hypertrophy was

significantly greater than the normal appendix specimens. Out of 61 cases in 40 cases the lumen was obstructed by the faecolith. Analysis of existing data suggests the peripheral nerves may physiologically be in a constant state of modeling under different situations and that a variety of stimuli, such as inflammation or injury, can effect nerve remodeling<sup>(1,2)</sup>. A transformation of epithelial cells to the neurons was described long ago by Masson<sup>3</sup> (1928) and confirmed by Van Campenhout<sup>4</sup> (1967) in the human appendix Neuronal proliferation may therefore represent a form of inflammatory response. Well developed neuronal changes to the extent seen in this study were developed during continuous episodes of inflammation and suggest a preexisting stimulus such as repeated episodes of subclinical inflammation or a response to obstruction.

**Fig no 5:** Hyperplastic epithelium in chronic appendicitis (40X)



In the gastro intestinal tract neurotrophic factors regulate plasticity of the nervous system<sup>4</sup>. According to Segal.G<sup>5</sup> mucosa of the appendix contain neuroendocrine complex. It is important to remember that epithelial hyperplasia can occur as a nonspecific reaction adjacent to or overlying any mass or inflammatory lesion and therefore can be clue to the presence of an adjacent, clinically important lesion<sup>6</sup>. In our study out of 61cases 19 cases showed hyperplastic epithelium and in that most of the cases belong to chronic appendicitis either presenting faecolith or along with eosinophilic infiltration as a result of food allergy or worm infestation

## Conclusion

The neuronal increase will increase motor activity. A highly speculative idea is the

transformation of non nervous or stem cells in the plexuses to neurons..Several studies have shown that inflammation can effect or affect nerve remodeling. Epithelial hyperplasia may be one of the contributing factors for expelling the contents in the lumen the neuronal increase will increase motor activity.

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