Original Article

Indian Journal of Pathology: Research and Practice

Spectrum of Gastrointestinal Polyps in Children: Does Eosinophilic Infiltration in Juvenile Polyps Have Any Significance?

Ramani Malleboyina, MD*

Afshan Jabeen**

Ramesh Reddy, MS, MCH***

Sreenivas Reddy, MS, MCH****

Othuluru H. Radhika, MD*****

Kayla Geetha, MD******

*Professor of pathology, Niloufer Hospital, Hyderabad, India.

**Junior resident, Department of Pathology, Niloufer Hospital,Hyderabad , India.

***Professor and HOD, Department of Pediatric Surgery, Niloufer Hospital, Hyderabad , India.

****Professor, Department of Pediatric Surgery, Niloufer Hospital, Hyderabad , India.

*****Assistant Professor, Department of Pathology, Niloufer Hospital, Hyderabad, India.

******Assistant Professor, Department of Pathology, Niloufer Hospital, Hyderabad, India

Abstract

Context: Gastrointestinal polyps are common in children with juvenile polyps being the most common type, accounting for 90% of cases.[1] The reported incidence of juvenile polyposis syndrome is between 1 in 100,000-1 in 160,000.[2] Present study reviews histopathology, distribution and clinical manifestations of gastrointestinal polyps in children and significance of mucosal eosinophilia in Juvenile polyps. A comprehensive knowledge of these disorders is necessary for correct treatment and follow up.

Aims: To study histology and distribution of intestinal polyps and to analyze significance of stromal eosinophilia in the pathogenesis of Juvenile polyps.

Settings and Design: Three year retrospective and two year prospective study between May 2007 and April 2012.

Methods and Materials: Forty two cases of gastrointestinal polyps in children were studied. Polyp size, number and location were noted. Association between stromal eosinophilia and age/size in case of juvenile polyps was studied.

Statistical analysis: Chi square test (PSPP software)

Results: There were thirty four solitary juvenile polyps, two multiple juvenile polyposis cases, three inflammatory polyps and three Peutz Jeghers polyps. Most common site was rectum and mean age was 6.7 years. Eosinophilic infiltration showed positive correlation with size and inverse correlation with age in juvenile polyps.

Conclusions: Majority of polyps in children are solitary juvenile polyps. Presence of significant eosinophilic infiltration of polyps may suggest a role of allergy in etiopathogenesis of juvenile polyps.

Keywords: Eosinophilic infiltration; Gastrointestinal polyps; Pediatric polyps.

Corresponding Author: Dr. Ramani Malleboyina, Flat No. D405, Keshav Dale Apartments, 2- plane, Anand Nagar, Khairathabad, Hyderabad - 500004, India.

E-mail: drmramani@sify.com

(Received on 23.04.2013, Accepted on 29.04.2013)

Introduction

The word polyp comes from the Greek word "polypus" meaning 'many footed'. A polyp is

any excrescence or growth protruding above a mucous membrane.[3] Majority of polyps in pediatric age are solitary juvenile polyps.[1] Their etiology is still unknown. Roma Gianikou *et al* have reported increased incidence of stromal eosinophilia in cases of juvenile polyps.[4] Taking in view the presence of eosinophils in a number of cases of juvenile polyps, we have endeavored to study the possible role of eosinophilic infiltration in the etiopathogenesis of these polyps. We have also studied other types of polypoidal lesions in pediatric age.

Materials and Methods

This was a three year retrospective and two year prospective study conducted between May 2007-April 2012. Forty two cases of gastrointestinal polyps in children were studied. Both polypectomy and bowel resection specimens were studied. Demographic data, mode of presentation, polyp size, number and location were noted. Sections were routinely processed and stained with Hematoxylin and Eosin.

Polyps were classified according to their size into the following categories: less than one cm, between one and two cm and above two cm. Significant eosinophilic infiltration in the lamina propria of polyp was defined as the presence of more than twenty eosinophils/high power field. Statistical analysis was carried out using the chi square test(PSPP software).

Results

Of the forty two cases studied, twenty three (54.76%) were boys and nineteen (45.24%) were girls. The age range was between two to twelve years with a mean age of 6.7 years. The mode of presentation was painless, intermittent rectal bleeding and mass per rectum in case of rectal polyps. The more proximally located polyps presented with abdominal pain, chronic rectal bleeding and anemia. Two cases presented with intussusception causing intestinal obstruction.

Thirty three cases had rectal polyps, four cases had colonic polyps, three cases had jejunal polyps and two cases had ileal polyps.

The polyps were also classified based on their histology. (Table 1)

There were thirty four (80.9%) cases of solitary juvenile polyps. Grossly, they were polypoidal, grey white masses ranging in size from 0.5 to 1.5 cm. Histology revealed many cystically dilated glands in an inflamed and edematous lamina propria containing inflammatory infiltrate composed of neutrophils, lymphocytes, eosinophils, plasma cells and histiocytes. (Figure 1)

There were two (4.8%) cases of multiple juvenile polyposis. In our study, the number of polyps ranged from ten to fifteen and were distributed throughout the colon. (Figure 2) Histological features were similar to solitary juvenile polyps.

There were three (7.1%) cases of Peutz Jeghers polyps. The polyps were located in jejunum and ileum and the number ranged between three and five. They were cauliflower like and pedunculated. Histology revealed a polyp containing smooth muscle in an arborizing arrangement covered by a mucosal lining.

There were three (7.1%) cases of inflammatory polyp. Histology revealed extensive inflammatory infiltrate and granulation tissue.

Table 1: Polyps classified according to histology

➢ Types of polyps	Solitary juvenile polyps	Juvenile polyposis coli	Peutz Jeghers polyps	Inflammatory polyps
Eosinophilic infiltration(>20/HPF)	30	0	0	0
Eosinophilic infiltration(<20/HPF)	4	2	3	3

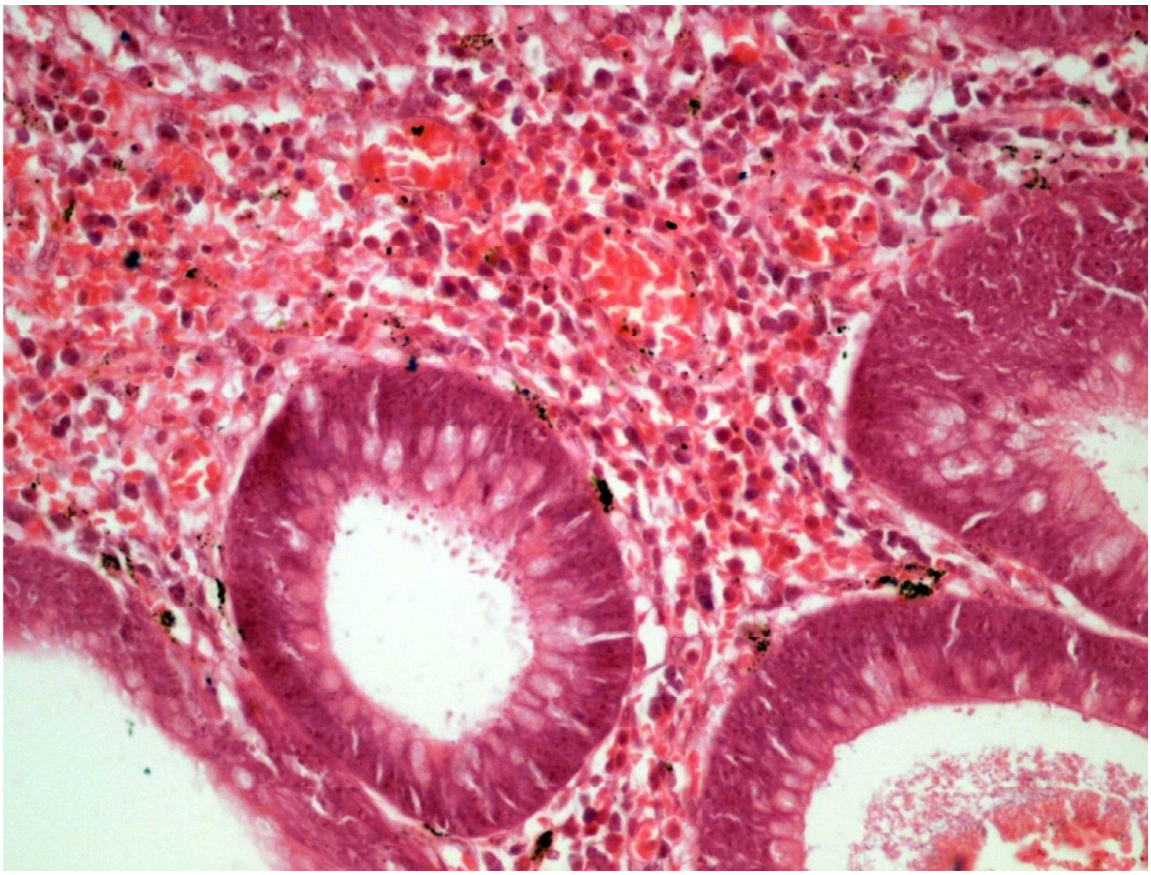
Table 2: Correlation of eosinophilic infiltration with size of juvenile polyps

➢ Size	<1 cm	1-2 cm	>2 cm	Total
Eosinophilic infiltration(>20/HPF)	7	19	4	30
Eosinophilic infiltration(<20/HPF)	5	1	0	6
Total	12	20	4	36

Table 3: Correlation of eosinophilic infiltration with age

➢ Age groups	2-4 years	4-6 years	6-8 years	8-10 years	10-12 years	Total
Eosinophilic infiltration(>20/HPF)	6	8	8	6	2	30
Eosinophilic infiltration(<20/HPF)	0	0	1	2	3	6
Total	6	8	9	8	5	36

Figure 1: Photomicrograph of juvenile polyp showing cystically dilated glands and dense infiltration with lymphocytes, eosinophils and histiocytes. H&E40X

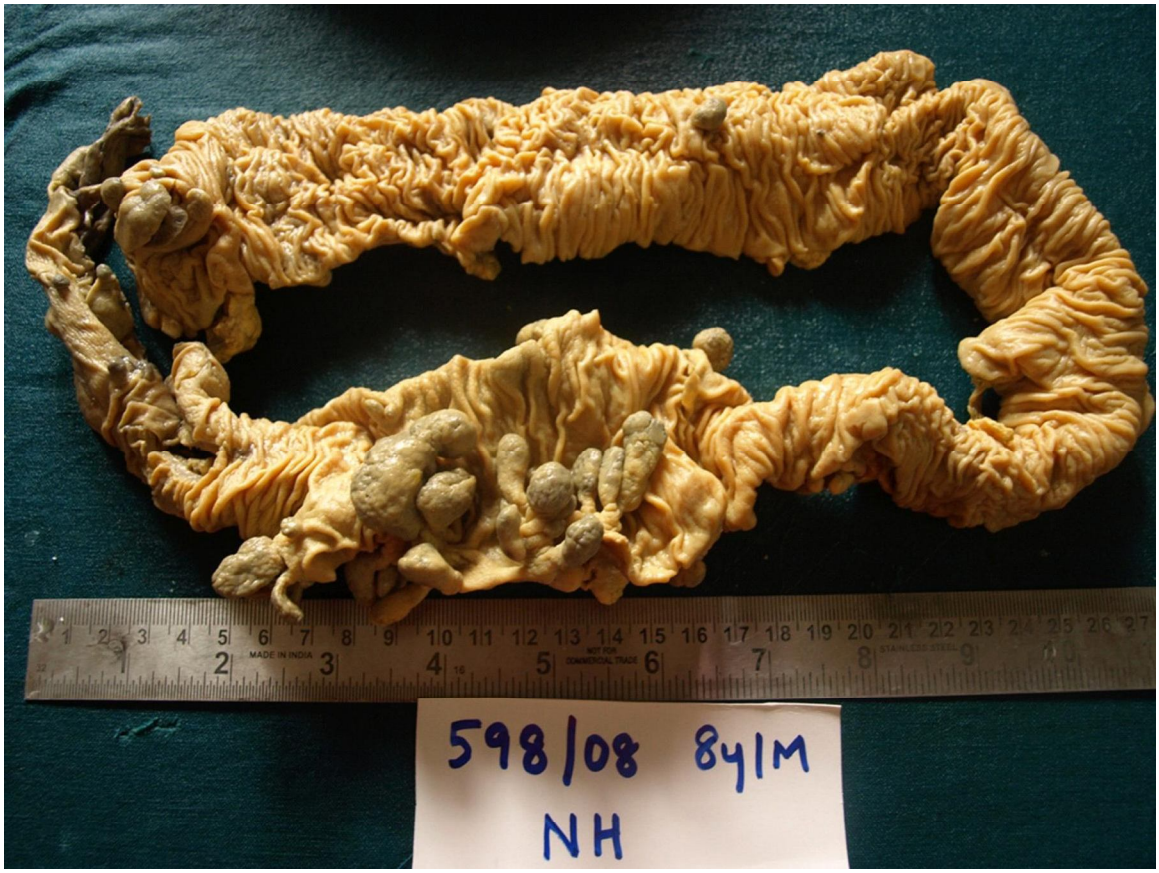


Of the thirty cases of juvenile polyps (thirty four solitary juvenile and two juvenile polyposis), thirty cases had significant eosinophilic infiltration in the polyps. Multiple juvenile polyposis cases did not show eosinophilic infiltration. None of the Peutz Jeghers and inflammatory polyps showed significant eosinophilic infiltration.

Thirty six children aged between two to twelve with juvenile polyps were studied for any relationship between size of the juvenile polyp and eosinophilic index (Table 2). Correlation between age of the patient and eosinophilic index was also studied (Table 3).

The results showed an inverse correlation

Figure 2: Gross photograph of Juvenile polyposis coli showing colon with multiple polyps



between increasing age and eosinophilic index with a Pearson's chi square value of 10.16 and a p-value of 0.04.

The test also showed a positive relationship between size and eosinophilic index with chi square value of 8.16 and p-value of 0.02.

Discussion

Gastrointestinal polyps are common in children and may pose a diagnostic challenge in some cases. Although demonstration of germ line mutation can confirm the diagnosis in some of the familial polyposis syndromes, it may not be possible in all cases. Hence the pathologist's accurate description of polyp assumes a critical role. This may have significant diagnostic implications both for the patient and his relatives due to the associated risk of malignancy in some of the polyposis syndromes.

The majority of polyps in pediatric age group are solitary juvenile polyps or retention polyps accounting for ninety percent of cases.[1] Estimates reveal that one to two percent of children have one or more juvenile polyps in the age groups of two to ten years.[2] They usually present with bleeding per rectum. Solitary Juvenile polyps have essentially no malignant potential. However when juvenile polyps are multiple, risk of cancer is present.[5]

Juvenile polyposis syndrome is an autosomal dominant syndrome characterised by mutations in *SMAD4* and *BMPR1A* genes.[5] It can be defined by any one of the following criteria: five or more juvenile polyps of the colon and rectum, juvenile polyps throughout the gastrointestinal tract, or any number of juvenile polyps in the gastrointestinal tract with a family history of juvenile polyps.[2] JPS is associated with enhanced risk for development of colonic, gastric, intestinal, and pancreatic carcinoma.[5]

Peutz-Jeghers syndrome (PJS) is an autosomal dominant hamartomatous polyposis syndrome associated with mucocutaneous hyperpigmentation. Its prevalence is 1 per

200,000 cases.[5] The diagnosis of PJS is clinically established by the presence of histologically confirmed hamartomatous polyps with any two of the following criteria: a positive family history of PJS; mucocutaneous pigmentation and presence of small-bowel polyps.[5] The mucocutaneous pigmentation is found most commonly around the mouth, nose, lips, buccal mucosa, hands, feet, perianal and genital regions. The polyps in PJS may be found in the stomach, small intestine, or colon being most prominent in the small intestine. The polyps have a unique histology, composed of proliferating and crisscrossing smooth muscle bundles, which give the appearance of a tree and its branches, hence the term 'arborisation'.[5]

Present study is consistent with studies conducted so far in many aspects that most common polyps in children are benign juvenile polyps. They are more common in boys than in girls and the most common site is rectum. They usually present with painless rectal bleeding and are more common in first decade of life as is the case in the present study.

Our study results are corroborated by Salma Fettahoglu *et al.*[6] The number of juvenile polyps carries significance because presence of more than five polyps indicates the presence of juvenile polyposis. Juvenile polyposis syndromes harbor a risk of increased malignancy having a thirty nine percent cumulative life-time risk of colorectal cancer.[2]

Little is known about the etiology of juvenile polyps. Lipper *et al* have proposed that disturbed cell surface renewal leads to erosion of mucosal surfaces leading to inflammation and granulation tissue formation.[7] Iwamoto *et al* have reported accumulation of beta catenin in epithelial cells of juvenile polyps.[8] Roma Gianikou *et al* have reported increased incidence of stromal eosinophilia in cases of juvenile polyps.[4] Alexander *et al* proposed allergy as a possible factor in etiopathogenesis of polyps.[9] In our study we have observed a positive relationship between size and eosinophilic index and an inverse correlation between increasing age and eosinophilic index in case of juvenile polyps. So we could also propose the role of eosinophilia and in turn allergy as a possible etiopathogenic factor. Eosinophils are a source of many cytokines which may contribute to evolution of polyp supporting an inflammatory etiology. Very few studies have been conducted so far studying the association between juvenile polyps and allergic disorders. Additional studies with detailed clinical work up for allergic disorders in such cases would shed further light upon the etiopathogenesis of juvenile polyps.

Conclusion

In conclusion, solitary juvenile polyps are the most common polyps observed in pediatric age group. In our study, we have observed a positive correlation between eosinophilic infiltration and size of the polyp and an inverse correlation with age. In view of these findings, we propose an allergic etiology for juvenile polyps.

References

1. Ujjal Poddar, BR Thapa, K Vaiphei, KLN Rao, SK Mitra, Kartar Singh. Juvenile polyposis in a tropical country. *Arch Dis Child.* 1998; 78: 264–266. adc.bmj.com
2. Lodewijk AA Brosens, Danielle Langeveld, W Arnout van Hattem, Francis M Giardiello and G Johan A Offerhaus. Juvenile polyposis syndrome. *World J Gastroenterol.* 2011; 17(44): 4839–4844.
3. Hamilton SR, Aaltonen LA (Eds). World Health Organization Classification of Tumours. Pathology and Genetics of Tumours of the Digestive System. Lyon: IARC Press; 2000.
4. ES Roma-Giannikou1, ThA Papazoglou1, JV Panayiotou1, CP van Vliet2, S Kitsiou3, V Syriopoulou, GC Geroulanos. Colon Polyps in Childhood: Increased Mucosal Eosinophilia in Juvenile Polyps. *Annals of Gastroenterology.* 2008; 21(4): 229-232.
5. Michael Manfredi, MD. Hereditary Hamartomatous Polyposis Syndromes. Understanding the Disease Risks As Children Reach Adulthood. *Gastroenterol Hepatol (N Y).* 2010; 6(3): 185–196.
6. Cigdem Ulukaya-Durakbasa, Meltem Caglar, Selma Fettahoglu *et al.* A clinical experience on

colorectal polyps. *The Medical Journal of Goztepe Training and Research Hospital.* 2012; 27(1): 1-5. available from http://www.sbgoztepehastanesi.gov.tr/goztepetipdergisi/arsiv/2012/mart/mart1-5.pdf. accessed on 5/1/13 . 5:30PM)

7. MD Stanley Lipper, MB, BCh, MRC Path, Leonard B, Kahn D, Robert S Sandler, MD Vijay Varma. Mulltiple juvenile polyposis: A study of the pathogenesis of juvenile polyps and their relationship to colonic adenomas. *Human Pathology.* 1981; 12(9): 804–813
8. Iwamoto M, Hoffenberg EJ, Carethers JM, *et al.* Nuclear accumulation of beta-catenin occurs commonly in the epithelial cells of juvenile polyps. *Pediatr Res.* 2005; 57: 1-3.
9. Alexander RH, Beckwith JB, Morgan A, Bill AH. Juvenile Polyps of the Colon and their Relationship to Allergy. *Am J Surg.* 1970; 120: 122.