

AN ATTEMPT TO UNRAVEL FEATURES OF PNEUMATOSIS CYSTOIDES INTESTINALISSunil Kumar B¹, Suneeta Padhy², Inbasekar Poovizhi³, Ramaswamy Anikode Subramanian⁴**HOW TO CITE THIS ARTICLE:**

Sunil Kumar B, Suneeta Padhy, Inbasekar Poovizhi, Ramaswamy Anikode Subramanian. "An Attempt to Unravel Features of Pneumatosis Cystoides Intestinalis". Journal of Evolution of Medical and Dental Sciences 2014; Vol. 3, Issue 13, March 31; Page: 3476-3483, DOI: 10.14260/jemds/2014/2308

ABSTRACT: Pneumatosis cystoides intestinalis (PCI) is a rare disease characterized by presence of multiple gas filled cysts in subserosal or submucosal wall of large intestine or small intestine. PCI are most commonly due to an underlying disease or can be idiopathic. Understanding of etiology and pathogenesis is necessary in each individual case for appropriate management. Thirty eight enteral resected specimens were studied from January 2008 to September 2011 in PESIMSR. Clinical and morphological characteristics of the 3 cases with histological diagnosis of PCI found, were studied and compared with other studies.

KEYWORDS: Pneumatosis cystoides intestinalis.

INTRODUCTION: Pneumatosis cystoides intestinalis (PCI) is a rare disorder, characterized histologically by the presence of multiple gas filled cysts in the subserosal or submucosal wall of the large or small intestine.¹ PCI is most commonly due to an underlying disease or can be idiopathic. Understanding of the etiology and pathogenesis is necessary in each case for appropriate management.

MATERIALS AND METHODS: This is a retrospective study conducted on all resected enteral specimens, received in department of pathology, PESIMSR, Kuppam from January 2008 to September 2011. Clinical details and histopathological slides were retrieved from the archives in the department of pathology.

AIM OF STUDY: To study the frequency, clinical features, and histomorphological characteristics of histologically diagnosed PCI.

RESULTS: During the prescribed study period, a total no of 38 enteric specimens were analyzed. The most common indication found for surgical resection was perforation. Most of these resections occurred in the age group of >40 years (table1) with a male preponderance (M-24: F-14). Small bowel resections were common among all the resections (table 2). Three cases with histological features of PCI were observed and all were found in small bowel resections.

Case 1: 60 year old male, presented with lower abdominal pain and vomiting. Ultrasound studies showed bowel wall thickening in ileocaecal region and free fluid in paracolic gutter. Three segments of small intestine were received in our department which showed mucosal ulceration and multiple cystic spaces in the wall (fig1, 2). Microscopically, cystic spaces with no lining epithelium, surrounded by foreign body giant cells were seen. (Fig. 3, 4).

ORIGINAL ARTICLE

Case 2: 55 year old male, presented with pain abdomen and fever. Segment of small intestine was received in our department which showed edematous mucosa. Microscopically, these cystic spaces had no lining epithelium and was surrounded by foreign body giant cells.

Case 3: 16 year old male, presented with acute pain abdomen. Small intestine perforation was found intraoperatively. Grossly perforation was confirmed. Microscopically, these cystic spaces had no lining epithelium; however no foreign body giant cells were observed (fig. 5, 6).

Abdominal ultrasonographic studies were done in all 3 cases, which did not detect presence of PCI. All the patients were symptom free after six month follow up.

DISCUSSION: PCI was first described by Du Vernoy in 1730, in autopsy specimens. Mayer named these entities as PCI in 1825.^{2,3} PCI diagnosis in surviving patients was first established by Hahn in 1899³. A PCI diagnosis via preoperative radiological findings was first described by Baumann-Schender in 1939.³ PCI are classified into primary and secondary. Secondary PCI term was coined by Koss in 1952, who analyzed 213 pathological specimens and attributed 85% of the cases to a secondary disease.³ The incidence of PCI is unknown, because it is usually asymptomatic.³

PCI is found to be more common in males, compared to females (3-3.5:1)^{4,5} Knechtle et al⁶ had equal incidence among males and females^{3,6}. Most of the studies have stated, colon to be the most common site of PCI compared to small intestine.² In our study all three cases showed PCI in the small intestine. There are many symptoms of PCI, including abdominal pain, abdominal distention, diarrhea, mucous stool, bloody stool and constipation.^{2,7}

Imaging studies which are useful in diagnosing PCI are plain abdominal X-rays, Opaque enema, Computerized tomography, Ultrasonography, MRI, and colonoscopy. Among these abdominal X-rays are the most reliable examination.⁸ But some subtle cases are missed on radiography and diagnosis is possible only on pathological examination⁹. Though radiological examination detects most of these cases, pathological examination is a must in few cases where a endoscopy biopsy is warranted. Though pathological examinations are useful, only few studies have described the microscopic features. A larger study on microscopy will probably reveal features of prognostic importance.

Only 4 cases of PCI were found in literature where histological features were described. Saber A et al¹⁰ will be designated as case 4, Sakurai Y et al¹ will be designated as case 5, Mutha S et al¹¹ will be designated as case 6 and Chun-Hsiung Liu et al⁷ as case 7. Age of presentation in literature (case 4, 5, 6, and 7) was 45 to 79 years. Our cases 1 & 2 had similar age group, but case 3 was in younger age group (16 years). Range of age group in Arikanoglu Z et.al study was 29-74 years and in Wu LL et al study was 2-81 years.^{2,3}

All the cases in literature had a common presenting symptom as pain abdomen, which correlated with our clinical symptoms. Pain abdomen was the most common symptom seen. Abdominal distension was seen in 3 literature cases (case 5, 6 & 7). None of our cases showed distention of abdomen (table 3); however emesis was seen in one case (case 1). Grossly our cases showed mucosal ulceration, edema and perforation. In addition, case1 showed multiple cystic spaces in wall.

All cases of literature had multiple cysts which were grossly detectable (table4). Microscopy showed cystic space in all the cases.

ORIGINAL ARTICLE

All cases had giant cell reaction except case 3 and 4 (table 5). Subserosal location of cysts was common finding, but an exclusive submucosal cyst was seen in case 3 which presented with acute abdomen and perforation. Subserosal cysts are known to be associated with secondary forms of PCI.³ Etio-Pathogenesis is bacterial, mechanical or pulmonary for PCI¹² (fig. 7).

In case 1, no pulmonary cause was detected but, intraoperative finding showed an enterovesical fistula. Microscopy showed no underlying cause and only chronic inflammatory process with PCI was noted. Case 2 showed volvulus intestinal obstruction.¹³ Case 3 showed intestinal perforation. So in case 1, 2 and 3 a mechanical etiological factor had a role. But in case 3, whether perforation led to PCI or PCI led to perforation remained an enigma. In case 4 and 5 bacterial, mechanical and pulmonary factors had a role in pathogenesis.

In case 7 pathogenesis was related to pulmonary causes. Mechanical factors are the most common cause of PCI. Complications of PCI include intestinal obstruction, pneumoperitoneum, intussusception, volvulus, hemorrhage and intestinal perforation.¹⁰ Volvulus was a complication seen in 51 year old male in literature, which correlated with our case 2 showing similar age group and location¹³. No therapy is required for asymptomatic cases.¹⁰ For primary PCI, Metronidazole and hyperbaric oxygen are routinely used.¹⁴ For Secondary PCI with or without complication, surgery is indicated.¹⁰ In all our cases, the therapy was surgical because they presented with intestinal obstruction.

CONCLUSION: Pathogenesis in PCI is unclear and many factors play a role.¹⁰ Therapy of PCI may be conservative or surgical depending on the etiology or complication.¹⁴ Perforation may lead to PCI and one of the complications of PCI is perforation, so in a case with PCI with perforation it would be difficult to determine which was the initiating factor.¹⁰ PCI is an under recognized feature, often mistaken for artifact especially in subtle cases. Awareness of this rare entity and high index of suspicion with knowledge of etiopathogenesis can avoid major bowel surgery. Understanding of the salient microscopic features are essential, as small endoscopic biopsies will be diagnostic in subtle cases.

REFERENCES:

1. Sakurai Y, Hikichi M, Isogaki J, Furuta S, Sunagawa R, Inaba K et al. Pneumatosis cystoides intestinalis associated with massive free air mimicking perforated diffuse peritonitis . World J Gastroenterol. 2008; 14: 6733 – 56.
2. Wu LL, Yang YS, Dou Y, Liu QS. A systematic analysis of pneumatosis cystoids intestinalis. World J Gastroenterol 2013;19: 4973-8
3. Arikanoglu Z, Aygen E, Camci C, Akbulut S, Basbug M, Dogru O, Cetinkaya Z, Kirkil C. Pneumatosis cystoides intestinalis: A single center experience. World J Gastroenterol 2012; 18: 453-7
4. Koss LG. Abdominal gas cysts (pneumatosis cystoides intestinorum hominis); an analysis with a report of a case and a critical review of the literature. AMA Arch Pathol 1952; 53:523-49
5. Jamart J. Pneumatosis cystoides intestinalis: A statistical study of 919 cases. Acta Hepatogastroenterol. 1979; 26:419-22
6. Knechtle SJ, Davidoff AM, Rice RP. Pneumatosis intestinalis. Surgical management and clinical outcome. Ann Surg 1990; 212: 160-5

ORIGINAL ARTICLE

7. Chun-Hsiung Liu, MD, Hong Haw Chen, Wan-Ting Huang. Primary Pneumotosis Cystoides Intestinalis. *Chang. Gung Med J.* 2003; 26:144-7
8. Rivera Vaquerizo PA, Martins CA, Lorente García MA, Colmenarejo MB, Flores RP. Pneumatosis cystoides intestinalis. *Rev Esp Enf Erm Dig.* 2006; 98: 959-61
9. H, Khan M, Hudgins J, Lee K, Du L, Amorosa L. Gastrointestinal sarcoidosis associated with pneumatosis cystoides intestinalis. *World J Gastroenterol.* 2013; 19: 1135-9
10. Saber A. Pneumatosis intestinalis with complete remission: a case report. *Cases journal.* 2009; 2: 7079 – 82.
11. Mutha S, Kumbhalkar DT, Bobhak SK. Pneumatosis cystoides intestinalis – a case report. *Indian J Pathol Microbiol.* 1999; 43:157 -8.
12. Hughes DTD, Gordon KCD, Swann JC, Bolt GL. Pneumatosis cystoides intestinalis. *Gut.* 1966; 7: 553–7.
13. Hicham El B, Abdelmalek, Benjelloun EB, Majdoub KI, Khalid M, Taleb KA. Ileal cystic pneumatosis revealed a volvulus of the small intestine. *Pan Afr Med J.* 2010; 6: 1-4
14. Braumann C, Menenkes C, Jacobi CA. Pneumatosis intestinalis – a pitfall for surgeon? *Scand J of Surg.* 2005; 94: 47 – 50.

Age group (years)	No. of cases
0-20	7
21-40	9
41-60	14
>60	8

Table 1: Total no of enteral resections-38

Resections	No. of cases
Small intestine	27
Large intestine	7
Both	4

Table 2

	Case 1	Case 2	Case 3	Total (our cases)	Case4	Case5	Case6	Case7	Total (literature cases)
Abdomen pain	+	+	+	3	+	+	+	+	4
Fever	-	+	-	1	-	-	-	-	-
Abdomen distention	-	-	-	-	-	+	+	+	3
Vomiting	+	-	-	1	-	-	-	-	-

Table 3: Clinical features

ORIGINAL ARTICLE

cases of PCI	Gross	Cystic spaces recognized grossly
Case 1	3 segments of small intestine with mucosal ulceration C/S: Multiple cystic spaces- submucosal and sub serosal	+
Case 2	Segment of small intestine with edematous mucosa	-
Case 3	Segment of small intestine with an area of perforation	-
Total	-	1
Compared cases	Gross	Cystic spaces recognized grossly
4. Saber A	Serosal intestinal air cysts involving jejunal & ileum	+
5. Sakurai Y et al	Multiple gas filled subserosal vesicles throughout bowel wall & the mesentery of small intestine	+
6. Mutha S et al	Multiple transparent thin walled cysts of varying sizes	+
7. Chun-Hsiung Liu, et al	multiple cobblestone-like lesions associated with gas-filled cysts distributed within the mucosa and submucosa	+
Total	-	4

Table 4: Gross features

Microscopy features ↓	Case 1	Case 2	Case 3	No. of cases	Case 4 Saber A	Case 5 Sakurai Y et al	Case 6 Mutha S et al	Case 7 Chun-Hsiung Liu, et al	No. of cases
Giant cell reaction	+	+	-	2	-	+	+	+	3
Sub mucosal cysts	-	+	+	2	+	+	+	+	4
Sub serosal cysts	+	+	-	2	+	+	+	+	4

Table 5: Microscopy features



Fig. 1: Multiple cystic spaces(arrows) in cut section of small intestine

ORIGINAL ARTICLE



Fig. 2: Multiple cystic spaces (arrow) in wall of small intestine

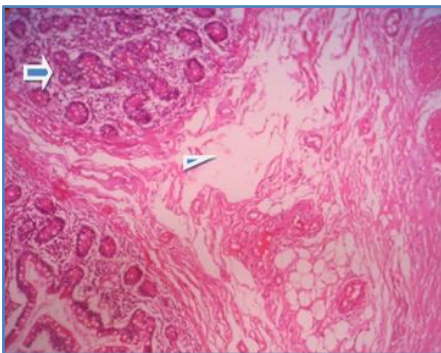


Fig 3: (arrow) Ileal mucosa, (arrow head) cystic spaces with no lining epithelia in submucosal region. H&E, 400X

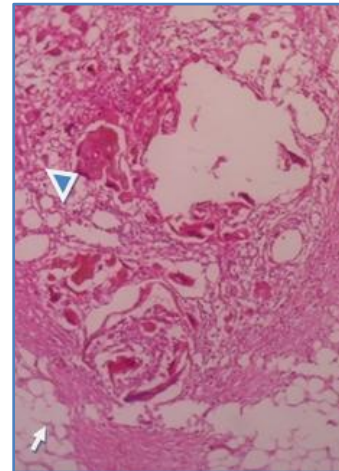


Fig 4: Cystic spaces with surrounding giant cell reaction in sub-serosal location. (arrow head) -giant cells, (arrow)- serosal fat. H&E, 100X

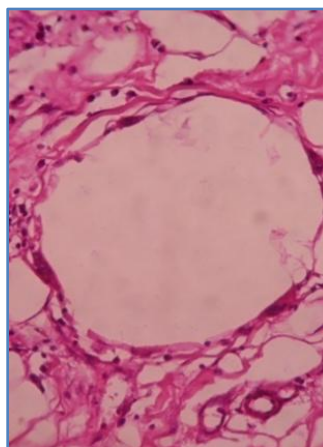


Fig. 5: Cystic space with no giant cell reaction. H&E, 400X



Fig. 6a: Subgross picture of small intestine-cystic spaces in the wall. (arrow-mucosa, arrow head-cystic space)

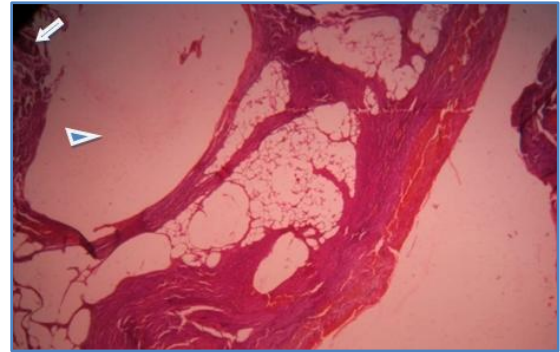


Fig. 6b: Cystic space with no giant cell reaction subserosal in location H&E, 100X. (arrow-mucosa, arrow head-cystic space)

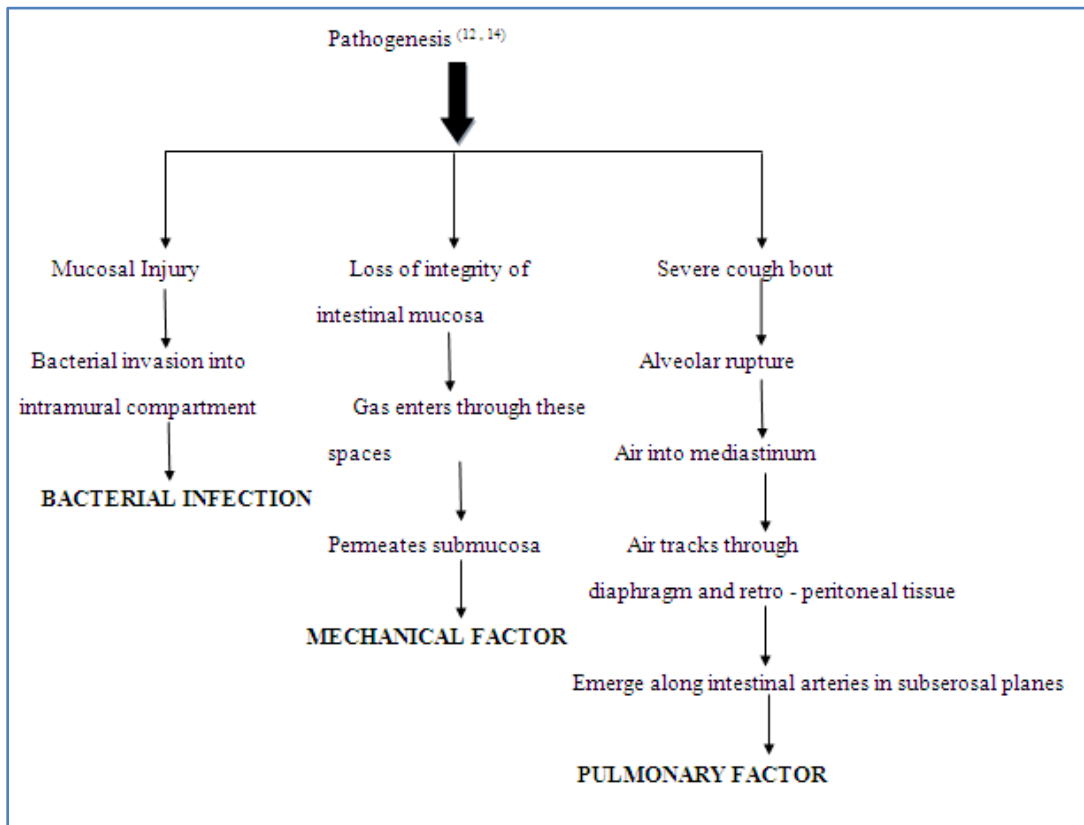


Figure 7

AUTHORS:

1. Sunil Kumar B.
2. Suneeta Padhy
3. Inbasekar Poovizhi
4. Ramaswamy Anikode Subramanian

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of Pathology, Akash Institute of Medical Science and Research, Bangalore.
2. Resident Specialist, Rajiv Gandhi institute of medical sciences, Srikakulum, Andhra Pradesh, India
3. Post Graduate, Department of Pathology, PESIMSR, Kuppam, Andhra Pradesh, India.
4. Professor, Department of Pathology, PESIMSR, Kuppam, Andhra Pradesh, India.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Sunil Kumar B,
No. 498, 10th Cross,
8th Main, Sadashivanagar,
Bangalore- 560080,
Karnataka, India.

E-mail: drsunil2011@yahoo.com

Date of Submission: 29/01/2014.

Date of Peer Review: 30/01/2014.

Date of Acceptance: 11/03/2014.

Date of Publishing: 28/03/2014.