

# Surgical Versus Non Surgical Management of Intussusception in Tertiary Care Hospital – An Observational Study

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## Abstract

### Background

Intussusception is the most common bowel obstruction in young children usually occurring between 4 to 10 months of age some of these may be transient and resolve spontaneously. If the intussusception is not relieved early, it may lead to bowel ischaemia and perforation , or peritonitis and may be fatal. Intussusception results from the alteration of normal peristalsis by a lesion on the bowel wall that creates invagination. It may occurs anywhere in the small and large intestine.

### Material and method

The study was conducted in 58 patients who were admitted to our general surgery department which were less than 18 years of age and were diagnosed cases of intussusception and were managed either surgical and non surgical management in year 2019 and 2020. The patients were selected on the basis of inclusion and exclusion criteria of the study and observation study was done from the day of onset of symptoms by detailed history taking and follow up of the patients till the management of the patient either surgically or non surgically method till the patient is well have normal bowel bladder habits.

### Results

The study contains 58 patients in which 44 are male 14 are female, and have male predominance with minimum age group is 1 month and maximum age group is 12 years out of 58 patients and the mean age is 29.12months and standard deviation of the same is 27.686. the mean weight of the children was found to be 11.03kgs with the range of 2.5kg to 30 kg (mean weight 11.03+\_ 5.660kg). Patients presented with the multiple symptoms with pain abdomen(100%) being the most common presentation followed by abdominal mass(91.4%) vomiting 50 patients(86.2%). The ileo colic type of the intussusception was found to be the most common followed by ilo ileo colic and colio colic type of intussusception.

**Keywords:** Ileo colic, ischaemia , peritonitis ,perforation, invagination.

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## I. Introduction

Intussusception is the most common bowel obstruction in young children , usually occurring between 4 to 10 months of the age. Some of these may be transient and resolve spontaneously. If the intussusception is not relieved early it may lead to bowel ischaemia and perforations, or peritonitis and may be fatal. Ileocaecal region the most common site some anatomical lead point may trigger in 10-15%cases.

Intussusception results from the alteration of normal peristalsis by a lesion in the bowel wall that creates invagination. It may occur anywhere in the small and large intestine. The nomenclature of intussusception reflects the location of the bowel enteroenteric ,appendiceal, appendiceal-ileocolic , ileocolic , rectoanal, and stomal intussusception. The upper gi structures, specifically the oesophagus stomach and duodenum are rarely involved in intussusception due to lack of mobility ,redundancy and characterstics anatomic fixation. The most common locations are the junctions between freely moving segments and areas that are fixed such as to the retroperitoneum (i.e the fully peritonised and mobile ileum intussusception into the fixed , retroperitoneal caecum) or through adhesions.

Ileocolic intussusception is the most common form of intussusception in children.

The etiology of paediatric intussusception is usually idiopathic , with only 10% of cases having an identifiable precipitating lesion. Various predisposing factors are thought to be contributing to the pathophysiology of paediatric intussusception.

Certain gastrointestinal anatomical features may predispose to the paediatric bowel to an intussusception, including an anterior insertion of the terminal ileum with respect to the caecum decreased rigidity of the caecum secondary to the absence or underdeveloped taenia coli , and lack of mature participation of the longitudinal muscle fibres of the colon at the levels of the ileocecal valve. These variations were identified by Scheyer et al in a postmortem evaluation of 15 autopsy specimens, with 3 of specimen used for the detailed evaluation of the ileocaecal valve anatomy. The development of intussusception may result from the invagination of the muscular ileocaecal valve into the caecum due to the decreased rigidity of the caecal wall caused by the paucity of the developed taenia coli.

The anatomical lead points occurs in 10% of the populations with intussusceptions. The trapped section of the bowel may have blood supply compromised which causes ischaemia . The mucosa is sensitive to ischaemia and responds by causing sloughing off into the gut. This creates the red current jelly stool, which is sloughed mucosa , blood and mucus “red current jelly stool ” occurs in a minority of cases of intussusception and will be considered within the medical diagnosis of youngsters passing any bloody stool.

In the paediatric population treatment depends on the type of intussusception ileocolic intussusception , the most common type in the children, requires reduction by ultrasound guided or fluoroscopic pneumatic or hydrostatic enema, and is successful in 85-90% cases. close observation is required due to possibility of recurrence within 1<sup>st</sup> 24 hours. Small bowel intussusception , which are uncommon in children , be safety monitored and may get reduced safely by themselves without any surgery.

However persistent intussusception associated with lead point or bowel necrosis would likely requires surgical intervention. Regardless of the intussusception type , surgery is indicated when enema reduction or close observation is unsuccessful.

With wide spread of ultrasonography many centers have started using hydrostatic reduction with ultrasound guidance for the treatment of the intussusception, as the perforation risk of hydrostatic reduction is reported as the 0.1%-0.3%.

Despite of the advantages of the hydrostatic reduction in the patients many patients presents late with symptoms what have continued with more than 48 hours and patients present with ileus and peritonitis and thus these patients are directly selected for surgical intervention.

Pharmacological adjuvant can facilitate nonsurgical management , but there efficacy remains controversial. For example glucagon is an antispasmodic adjuvant used by 10% -20% of practitioners which reduce colonis muscle tone and provide analgesic but recent review suggests that glucagon does not improve the rate of reduction in nonsurgical management of intussusception.

Surgical management typically entails open laparotomy , through cases series and retrospective studies indicate laparoscopy may be as effective and help in a shorter length of hospitalization. Surgical management is general indicated only in the cases with peritonitis, barrel perforation or shock occurs, if appropriate radiological facilities are unavailable ; or if contrast enema fails. However ,because nonsurgical management is associated with lower morbidity and shorter hospitalization, delayed repeated attempts at contrast enema may prove leading to surgical management.

## **II. Material And Methods**

The study was conducted in those patients who were admitted to our general surgery department which were less than 18 years of age and were diagnosed cases of intussusception and willingly gave consent for being the part of the study in year 2019 and 2020.

The patients were selected on the basis on inclusion and exclusion criteria of the study.

### ***Inclusion criteria:***

Patients with age less than 18 years

Symptoms less than 48 hours with no significant abdominal distension or intestinal obstruction (evaluated for nonsurgical management ).

Symptoms more than 48 hours with symptoms and abdominal distension (evaluated for surgical management).

No radiographic evidence of free peritoneal air.

Intussusception will not be prolapsed out of rectum.

### ***Few exclusion criteria.***

Age more than 18 years.

Patients with underlying other abdominal mass or pathology causing sign and symptoms.

Patients presented with adhesive intestinal obstruction after previous surgery.

Patients and guardians are not willing.

In all the cases preoperative assessment was done detailed history and clinical examination was done for all the cases. Assessment of vital function was done , simultaneously routine blood investigation like complete

blood count, liver function test, renal function test, RBS, PT, INR , Viral markers, ECG , and Chest Xray , and in all case USG whole abdomen was done.

Patients were managed according to the severity of symptoms and the related underlying features and best treatment modality with least complication and better results with minimal possible assess.

Patients who were diagnosed case of intussusception was assessed for the presence of peritonitis and for the severity of systemic illness after resuscitation and administartion of intravenous fluids and antibiotics the child is evaluated for the sustability to proceed with hydrostatic reduction versus surgical reduction. In the absence of peritonitis, the child underwent hydrostatic reduction , but in presence of peritonitis or if the child appears systemically ill, urgent exploratory laparotomy with manual reduction or resection anastomosis was planned an procedure were performed urgently without delayed for better outcome and early management.

### **Non surgical management (hydrostatic reduction)**

If the patient was in stable condition, non operative treatment of intussusception was tried. Hydrostatic reduction with hartmann’s solution was done. A foley’s catheter of the largest appropriate size (10F TO 18F) is inserted into the rectum and the ballon is gently inflated. Hartmanns solution is warmed to the body temperature , which is slowly hand injected into the foley’s catheter with 50ml syringe or hanged at a height of about 100cm above the level of buttocks. Hartmann’s solution was chosen for hydrostatic reduction because of its new physiologic solution. This fluid is classified as a balanced salt solution, as it is similar in composition of extra cellular fluid.

It consist of 131mmol/L sodium, 5mmol/L potassium, 29 mmol/L bicarbonate ,111mmol/L chloride , and 2mmol/L calcium. It has a pH OF 6.5 and an osmolality of 27.8mmol/L and it contains 9 kcal/L. A consistent force of injection is maintained, hydrostatic pressure is kept to within 90-100 mmHg by checking the pressure gauge attached to the foleys catheter via a three way. During reduction , the intussusceptum is observed under continuous ultrasound guidance as it proceeds to the caecum and reduces across the ileocaecal valve. If non operative reduction is successful , the infant may be given oral fluids after the period of observation.

### **Surgical management**

In an open procedure exploration is carried out through a right quadrant incision , with delivery of intussuscepted mass into the wound. Manual reduction is usually accomplished by gentle distal pressure, with the intussusceptum gently milked out of the intussusciens. Case should be taken not to pull the bowel wall. The blood supply to the appendix is often compromised and appendectomy is performed. If the bowel is frankly gangrenous, resection and primary anastomosis is performed. The bowel is inspected and if appears to be viable , reduction is performed by milking the bowel or gentle traction, although this approach is normally discouraged during manual reduction. Atraumatic bowel graspers allow the bowel to be handled without injuring it. Intravenous fluid should be continued till the postoperative ileus subsides. Patients are started on clear fluid and the diet is advanced as tolerated.

Recurrent intussusceptions occurs in 5-10% of the patients independent of the whether the bowel is reduced hydrostatically or surgically. Patients presents with the recurrent in the immediate postoperative period. Treatment involved repeated hydrostatic reduction either fails or contraindicated exploratory laparotomy with manual reduction or if gangrenous part presents resection anastomosis is done.

## **III. Results**

In this study out of 58 patients 14 are female (24.1/%) and 44 cases are male (75.9%).

SEX	MALE-1 FEMALE-2	No. of cases	Percentage
Male		44	75.9%
Female		14	24.1%
Total		58	100.0%

In this study minimum age group is 1 month and maximum is age grup is 12 years from total 58 patients. Thus mean age is 29.12 months and standard deviation of the same is 27.686 months.

In this study mean weight of children was found to be 11.03kgs with range of 2.5kg to 30kgs (mean weight 11.03+-5.660kg).

Patients presented with the multiple symptoms with pain abdomen being the most common presentation(100%) followed by abdominal mass 53 patients (91.4%), vomiting 50 patients (86.2%).

Majority of the patients reported to our institution day 3 of onset of symptoms >2(30 patients 51.7%) followed by symptoms onset less than <2 days (28 patients 48.3%). The mean day of symptoms of onset is 2.74day+\_1.671(standard deviation) with minimum day 1 and maximum 10 days of onset of symptoms.

<b>EARLY-1/LATE-2 DIAGNOSIS</b>	No. of cases	Percentage
1	28	48.3%
2	30	51.7%
Total	58	100.0%

In our study, ileocolic type of the intussusception was found to be most common 51 patients (87.9%) followed by ileo-ileocolic and colio-colic.

<b>TYPES OF INTUSSCEPION ILEOCOLIC-1 COLOCOLIC-2 ILEOILEOCOLIC-3</b>	No. of cases	Percentage
1	51	87.9%
2	2	3.4%
3	5	8.6%
Total	58	100.0%

In our study majority of cases show lower abdominal mass 48 cases (82.8%) followed by upper abdominal mass 10 cases (17.2%).

<b>LOCATON OF INTUSSUSCEPTION LOWER ABDOMEN - 1 UPPER ABDOMEN -2</b>	No. of cases	Percentage
1	48	82.8%
2	10	17.2%
Total	58	100.0%

In this study the diagnostic criteria used was ultrasonography in which multiple findings were observed in the patients in the abdomen , most prevalent was the pseudo kidney sign along with the other findings(pseudo kidney sign was found in approximately 55 cases (94.8%) patients along with mysentric lymph nodes (29 cases 50.3% patients) followed by peritonitis and hypoechoic mass.

<b>ULTRASONOGRAPHY FINDINGS</b>	No. of cases	Percentage
<b>MESENTRIC LYMPHNODES</b>	29	50.0%
<b>MECKELS DIVERTICULUM</b>	3	5.2%
<b>PSEUDO KIDNEY SIGN</b>	55	94.8%
<b>PERFORATION/PERITONITIS</b>	8	13.8%
<b>HYPOECHOIC MASS</b>	6	10.3%

In this study patients were treated with the best treatment modality available and appropriate according to the condition and clinical findings of the patient. As this is a tertiary care centre patients report late with the complicated cases , so majority were treated with surgical management exploratory laparotomy with manual reduction 33 no of cases (56.9%) exploratory laparotomy followed by resection anastomosis 13 no of cases(22.4%) followed by hydrostatic reduction 12 no of cases (20.7%).

<b>TREATMENT HYDROSTATIC REDUCTION -1 EXPLORATORY LAPAROTOMY WITH MANUAL REDUCTION -2 EXPLORATORY LAPOROTOMY AND RESECTION ANASTOMOSIS -3</b>	No. of cases	Percentage
1	12	20.7%
2	33	56.9%
3	13	22.4%
Total	58	100.0%

In this study most of the patients have uneventful postoperative period but few patients presented with more than one postoperative complication. In which most common was fever 21 cases (36.2%) followed by postoperative pain 14 cases (24.1%) and only 2 cases had suture site infection(3.4%) and only one case (1.7%) had anastomosis leak rest 35 cases have no such complication (60.3%).

POST OPERATIVE COMPLICATION POSTOP PAIN -2 SUTURE SITE INFECTION -4 NO COMPLICATION-6	FEVER-1 BUST ABDOMEN -3 ANASTOMOSIS LEAK -5	No. of cases	Percentage
1		7	12.1%
1,2		12	20.7%
1,2,4		1	1.7%
1,3		1	1.7%
2		1	1.7%
4,5		1	1.7%
6		35	60.3%
Total		58	100.0%

POST OPERATIVE COMPLICATION	No. of cases	Percentage
FEVER	21	36.2%
POSTOP PAIN	14	24.1%
BUST ABDOMEN	1	1.7%
SUTURE SITE INFECTION	2	3.4%
ANASTOMOSIS LEAK	1	1.7%
NO COMPLICATION	35	60.3%

In this study age association with type of intussusception and gender association with type of intussusception was studied but result was of no significant.

In this study, majority of the patients were having weight in the category of 6-10 kgs. Association between the type of intussusception and the weight of the patients showed no significant in this study.

In this study, chi square test was used to calculate the association between the days of symptoms prior to the hospital presentation and treatment of intussusception was significant results were obtained for the two variables.

CLINICAL SYMPTOMS		EARLY/LATE DAIGNOSIS				Total	Chi-square value	p-value
		< 2 (n=28)	< 2 (n=28)	> 2 (n=30)	> 2 (n=30)			
PAIN ABDOMEN YES -1 NO-0	1	28	100.0%	30	100.0%	58		
VOMITING YES -1 NO-0	0	7	25.0%	1	3.3%	8	5.718	0.017
	1	21	75.0%	29	96.7%	50		
PER RECTAL BLEED YES-1 NO-0	0	21	75.0%	7	23.3%	28	15.483	0.000
	1	7	25.0%	23	76.7%	30		
ABDOMINAL MASS YES-1 NO-0	0	5	17.9%	0	0.0%	5	5.863	0.021
	1	23	82.1%	30	100.0%	53		
TYPE OF INTUSSUSCEPTION		EARLY/LATE DAIGNOSIS				Total	Chi-square value	p-value
		< 2 (n=28)	< 2 (n=28)	> 2 (n=30)	> 2 (n=30)			
TYPES OF INTUSSCEPTION ILEOCOLIC-1	1	27	96.4%	24	80.0%	51	3.912	0.141
	2	0	0.0%	2	6.7%	2		

COLOCOLIC-2 ILEOILEOCOLIC-3	3	1	3.6%	4	13.3%	5		
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In this study there was no significant seen between the two variables the sex of patient and treatment followed.

In this study symptoms are statically associated with the treatment modalities followed vomiting and per rectal bleeding and treatment followed and significant variables.

CLINICAL SYMPTOMS		TREATMENT NON SURGICAL MANGMENT (HYDROSTATIC REDUCTION -1 )SURGICAL MANAGEMENT (MANUAL REDUCTION -2 RESECTION ANASTOMOSIS -3)				Total	Chi-square value	p-value
		Non-Surgical	Non-Surgical	Surgical	Surgical			
PAIN ABDOMEN YES - 1 NO-0	1	12	100.0%	46	100.0%	58		
VOMITING YES -1 NO-0	0	7	58.3%	1	2.2%	8	25.244	0.0001
	1	5	41.7%	45	97.8%	50		
PER RECTAL BLEED YES-1 NO-0	0	11	91.7%	17	37.0%	28	11.408	0.001
	1	1	8.3%	29	63.0%	30		
ABDOMINAL MASS YES-1 NO-0	0	3	25.0%	2	4.3%	5	5.153	0.055
	1	9	75.0%	44	95.7%	53		

In this study different type of treatment modalities were used for the correction of intussusception depending upon the clinical feature and presentation of the patients. Non –Surgical (hydrostatic reduction ) and surgical ( exploratory laparotomy with manual reduction and exploratory laparotomy with resection anastomosis). Surgical management show significant correlation with symptoms of presentation of the patients.

DIAGNOSIS		TREATMENT HYDROSTATIC REDUCTION -1 MANUAL REDUCTION -2 RESECTION ANASTOMOSIS -3				Total	Chi-square value	p-value
		Non-Surgical	Non-Surgical	Surgical	Surgical			
EARLY-1/LATE-2 DAIGNOSIS	1	12	100.0%	16	34.8%	28	16.211	0.0001
	2	0	0.0%	30	65.2%	30		

#### IV. Discussion

The present study was an observational study which have been carried out in the department of general surgery in 58 diagnosed and confirmed cases of intussusception were only taken up for the study and evaluation done over the period of one year after the approved which were either treated surgically or by nonsurgical intervention procedure depending upon the case presentation and the stability of the patient. These cases were detailed studied from the onset of the symptoms by detailed history taking of the patients till the successful reduction of the intussusception confirmed either by the ultrasonography till its discharge on oral diet.

#### **Gender**

In this study the intussusception is more common in males(75.9%) than in females (24.1%) which is in the ratio 3:1 which is in accordance with the study conducted by Khan et al (95) in which male to female ratio in 3.4:1 which are in accordance with various study is conducted by Rege VM et al (87) in which male female ratio is 2.4:1, study by Sahoo R et al (88) have male (72.4%) female (27.6%), study by John M et al (9) have male to female ratio 2.05:1, study by Usang E et al (91) have male to female 2.2:1, study by Weihmiller et al (93) have

male population (61%) study by Bajaj et al (94) have male population (60%), study by Kumar et al(96) have male population of 64%.

### **Age**

In this study the intussusception is more common in infants and toddlers with 34 cases less than 2 years of age or median age of 27 months which is in accordance with the study conducted by the Rege VM et al (87) 73% patients are less than 1 years of age, study by Sahoo R et al (88) in which 90% are less than 2 years, study by Seigi K et al (89) 80% are less than 2 years study by John M et al (90) in which 80% patients are less than 2 years of age, study by Usang et al (91) 84% patients were less than 1 years in age which suggests that intussusception is most common in the infant and toddlers.

### **Clinical symptoms**

In this study most common presenting symptoms are pain abdomen (100%) followed by vomiting (86.2%) abdominal mass (91.4%) and rectal bleed (51.7%) which are in accordance with the study Sahoo et al (88) in which pain abdomen (100%) followed by vomiting (86%) followed by rectal bleed (51.7%) similar findings were seen in various studies John M et al (90), Julie EB et al (97), Hutchinson et al (98), Ein SH et al (99), Mansur SH et al (100).

### **Types of intussusception**

In this study most common type of intussusception is ileo-colic type (87.9%) followed by ileo ileocolic type (8.6%) followed by colio colic (3.4%) which is in accordance with the study conducted by Sahoo R et al (88) in which the ileocolic (94.6%) followed by ileo ileocolic (5.4%) and another study by John M et al (90) in which ileo colic (88%) followed by ileo ileal (7.69%) followed by colo colic (3.84%) and in study by Usang E et al (91) in which ileo colic (68%) followed by ileocaecal (20%).

### **Diagnostic criteria**

In this study the ultrasound imaging is used as the diagnostic criteria and is used in 100% cases to diagnose intussusception. The study by John M et al (90) says that ultrasonography scan has a sensitivity of approximately 98-100% and specificity of 98% in diagnosis of intussusception Usang M et al (91) in which study have 80% cases diagnosed by ultrasonography scan.

### **Findings on investigations**

The most common ultrasonography scan finding is pseudo kidney sign (94.8%) followed by mesenteric lymph node followed by perforation / peritonitis (13.8%) or Meckel's diverticulum (5.2%) and is helpful in diagnosing various lead points or etiology of intussusception which are in accordance with the study conducted with Sahoo R et al (88) and John M et al (90) in which mesenteric lymph nodes, perforation / peritonitis or Meckel's diverticulum are considered lead points. Similarly very few cases show any major lead points (3 cases with Meckel's diverticulum) and other majority of cases are idiopathic without any major lead point.

### **Treatment**

In this study the 12 cases (20.7%) cases were treated non surgical (hydrostatic reduction) and rest 46 cases (79.3%) were treated by surgical method in which 33 cases underwent exploratory laparotomy followed by manual reduction, and 13 cases underwent exploratory laparotomy followed by resection of the gut and end to end anastomosis due to perforation / peritonitis or the gangrenous changes (ischaemia) of the gut. Early diagnosis and non surgical management are directly correlated whereas delay in diagnosis lead to non surgical reduction failure due to which surgical intervention is required in the most of the cases in our study. In the study conducted by the Bajaj et al (94) (100%) all cases were managed surgically but in another study by John M et al only 2 cases underwent exploratory laparotomy and resection anastomosis.

In our study the postoperative (postprocedure) complication are not associated with the type of intussusception but are directly associated with the intervention followed (treatment modalities followed).

### **Post operative complication**

In this study 35 cases (60.3%) postoperative (post procedure) period was uneventful and the patients were discharged on oral diet in satisfactory condition but in rest of the cases there was postoperative complications there were more than one complication in few cases in which most common was postoperative pain and fever followed by suture site infection in 2 cases and anastomosis leak in 1 case. But there was no case of burst abdomen reported in this study. In this study the postoperative study is directly associated with the days of symptoms prior to presentation to hospital, pathological lead point and type of intraoperative finding and type of treatment modalities used for the same.

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