

INTUSSUSCEPTION IN CHILDREN

Sharma Surinder Mohan^{1*}, Dr. Yesvant Singh Pal², Dr. Atul Shishodia³ and Dr. Minakshi Singh⁴¹Brig (Retd), B.Sc, MBBS, MS, FAIS, Senior Consultant Surgeon, Gautam Buddh Chikitsa Mahavidyalaya, Jhajra, Dehradun. Uttarakhand.¹Ex Prof. & HOD, PG Department of Surgery Rohilkhand Medical College & Hospital.²Assistant Professor Department of Physiology, Gautam Buddh Chikitsa Mahavidyalaya, Jhajra, Dehradun.³MBBS, MS, Assistant Professor, Department of General Surgery, Kalyan Singh Government Medical College, Bulandshahar UP.⁴Assistant Prof., Dept. of Obs & Gynae, GDMC, Dehradun.***Corresponding Author: Sharma Surinder Mohan**

Brig (Retd), B.Sc, MBBS, MS, FAIS, Senior Consultant Surgeon, Gautam Buddh Chikitsa Mahavidyalaya, Jhajra, Dehradun. Uttarakhand.

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ABSTRACT

Intussusception occurs due to invagination of proximal intestine into the distal loop resulting in features suggestive of intestinal obstruction. Intussusception commonly occurs in small children less than one year of age following an episode of Gastroenteritis or viral infection. Pathological lead point is implicated in children in more than two years of age. At times the cause of Intussusception remains unidentified in children. Among elderly Intussusception is generally due to a lead point like Lipoma, Meckel's diverticulum or even the stump of amputated Appendix which may act as a lead point in causation of Intussusception. After the onset of Intussusception, the diagnosis in an infant becomes difficult. The child cries due to colicky pain flexing the lower limbs vigorously with brief intermission of remission from pain. In initial stages the classical diagnostic feature of palpable lump may be absent or difficult to appreciate. The patient may respond to non-operative method of reduction of Intussusception but recurrence is also not uncommon. The unrelenting persistence of Intussusception must be managed first by resuscitation, therapeutic enema or by surgical intervention in case patient remains unresponsive to non-operative techniques in hospital. About ten percent of the children require resection and anastomosis.

KEYWORDS: Acute Gastroenteritis, Intussusception, Lump abdomen, Pathological lead point, Gangrene small gut, Therapeutic enema.

INTRODUCTION

Intussusception is characterized by invagination of proximal intestinal loop into its distal part. Intussusception, which is defined as the telescoping or invagination of proximal portion of intestine into a more distal portion, is one of the most common causes of bowel obstruction in infants and toddlers.^[1] Intussusception was first described by Barbette in 1674, and it was first successfully treated surgically by Wilson in 1831. In 1876, Hirschsprung first reported the technique of hydrostatic reduction^[2], and in 1905, after monitoring a series of 107 cases, he reported a 35% mortality attributable to intussusception. The proximal invaginated part of intestine is called intussusceptum and the distal portion of the segment is called as intussusciptiens. The clinical diagnosis becomes uncertain as the non-stop crying of the baby results in tensed up firm abdominal wall musculature masking the presence of firm solid mass of intussusception lying underneath. It is not unusual for the parents and clinician to be misled by history of passage of frequent loose

motions resulting in inordinate delay in clinching the diagnosis of intussusception. Untreated, the child's condition deteriorates unless resuscitated and operated in time. The child with intussusception develops acute intestinal obstruction which may lead to gangrene of the involved gut resulting in fatal outcome. The patient must be subjected to highly diagnostic investigations like abdominal ultrasound, X-Ray abdomen and CT besides necessary supportive investigations required for surgery under GA.

DISCUSSION

Intussusception may result in mesenteric vascular obstruction, swelling of involved gut, gangrene, mucosal necrosis and even perforation. The incidence of intussusception is 1.5-4 cases per thousand live births with male to female ratio of 3:2.^[3] The intussusception generally occurs after the baby has suffered from episodes of respiratory tract infections and diarrhea. Respiratory syncytial virus and Adenovirus have been associated with occurrence of intussusception.

Intussusception may occur as ileo-ileal, ileo-ileal-colic, ileo-colic and colo-colic. More than 90 percent of intussusceptions are without any lead point. Lead points implicated in causing intussusceptions in children above three years and adults are Meckel's diverticulum, polyps, intestinal duplication^[4], lymphomas, lymphangiectasis^[5] submucosal hemorrhage with Henoch-Schonlein purpura, trichobezoars with Rapunzel syndrome, caseating granulomas due to abdominal tuberculosis^[6] hemangiomas and lymphosarcomas. Inspissated meconium in distal ileum too may cause intussusception. Other rare causes of intussusceptions are stump inversion^[7] after appendectomy as lead point, retrograde jejuno-jejunal intussusception after duodenal atresia repair^[8] and ileo-ileal type occurring after blunt trauma of abdomen.^[9] Intussusception may also occur due to familial disposition. Oshio *et al* of Japan implicated familial anatomical tendency resulting in intussusceptions during viral infections. The family history may help in identifying the gene responsible^[10] for the predisposition of intussusceptions after genetic testing. Babies suffering from intussusception do not appear to be poorly nourished. The lead points may cause asymmetrical distribution of peristalsis whereby the part of the segment having lead point starts invaginating. The progression of invagination continues into the lumen of the distal segment and at times the distal most part of intussusception may come out of the anal canal. The anatomical diagnosis in order of frequency includes ileo-colic intussusception (80%), ileo-ileo-colic (10%), ileo-ileal (8%), and colo-colic (2%).^[11] Intussusception causes lymphatic and vascular occlusion resulting in oedema of the gut, mucosal necrosis, mucosal sloughing and bleeding the whole complex mixed with mucous results in passage of red coloured stools known popularly as red currant jelly stools. The whole mass of intussusception becomes firm and gangrenous black which may ultimately perforate and cause life threatening peritonitis and septicemia.

It is difficult to ascertain the reason for child's agony and cries as they cannot express themselves. The attendant who is usually the mother of the baby too may not be able to give clue for the child's cries. It is certain that child cries due to pain in abdomen and the diagnosis remains uncertain till the classical typical presentation appears. The pain is colicky and appears during intestinal spasm with peristalsis to begin with and later becoming more marked as the parietal peritoneum too gets affected due to inflammation and peritonitis. The likelihood of intussusception must be foremost in mind in a crying baby which begins with colicky pain in abdomen, vomiting and palpation of sausage shaped mass in abdomen. The sausage shaped mass is well defined, firm, markedly tender and placed generally in right hypochondrium in line along the long axis of colon from hepatic flexure above the umbilicus in Ileo-Colic intussusception. The mass becomes palpable in between the cries when the baby becomes quiet. During cries the anterior abdominal wall becomes tense and guarded and

therefore the mass becomes masked under the tense muscles. The colicky pain appears frequently with intervals of relief from pain. The clinician specially the Surgeon must have patience to wait for the baby to stop crying and moment the baby stops crying the clinician must make a careful palpation of abdomen quickly to clinch the diagnosis of intussusception. During palpation the right iliac fossa appears to be empty a feature known as positive Dance sign. Intussusception results in mucosal ischaemia, ulceration and bleeding mixed with mucous giving it an appearance of red currant jelly like stools. During severe colicky pain in abdomen the baby flexes the lower limb joints in agony. The triad of abdominal pain, palpable mass and passage of red coloured stools should raise the suspicion of intussusception. Intussusception may bulge out from the anus with progression of intussusception distally. With passage of time and delay in giving appropriate treatment the entire gut involved in intussusception becomes gangrenous giving it an appearance of dark brown black solid mass. Untreated, the baby becomes, dehydrated, exhausted, listless, develops fever and becomes critically and dangerously ill. Surgeon must be ever vigilant and concerned to recognize the extreme gravity of situation. The baby should be resuscitated and pediatrician and anesthesiologist be consulted at once. Resuscitation and investigations must proceed simultaneously to make the baby fit to undergo surgery. Time consuming investigations like CT may not be favoured at this juncture of emergency. Though CT scan is 100 percent diagnostic in terms of sensitivity and specificity but takes long time to undertake this investigation and therefore simpler less time-consuming investigations be undertaken. CT scan does confirm the popular landmarks of intussusception namely target sign, sausage shaped mass, the pseudo-kidney sign, bull's eye sign and claw sign. It also shows signs of complications such as submucosal edema, signs of peritonitis, or perforation and other abnormalities.^[12]

Besides mandatory metabolic and biochemical investigations the non-operative and operative measures to save the life of infant must be conducted. A simple plain X Ray of abdomen will show multiple air-fluid levels due to intestinal obstruction, distention and dilatation of gut proximal to site of intussusception. Ultrasound abdomen too will reveal target sign showing mixed echogenic layers of walls of intestine involved in intussusception. This will also show the Sandwich sign in longitudinal section, confirm solid mass at the site of intussusception and reveal hay fork sign. Ultrasound is the diagnostic test of choice with a sensitivity and negative predictive value close to 100% and a specificity of 88% to 100%.^[13] In Paediatric age group other acute abdominal conditions like Acute Appendicitis, Acute Gastroenteritis, Meckel's diverticulitis and volvulus of small intestine too should be kept in mind. Often the treatment of intussusception gets delayed because of late diagnosis. At times instead of bringing the child to a proper surgical treatment center for management the

parents keep on visiting unqualified medical mendicants which results in deterioration of general condition of the patient.

Management of Intussusception in children by non-operative measures

Once diagnosis of intussusception is confirmed the expeditious steps for management must be taken to manage the intussusception in children who may be seriously ill with fluid and electrolyte imbalance, dehydration and peritonitis. The children definitely need attendance of Pediatrician, Surgeon and Radiologist. The cause of intussusception in children above 5 years may be due to some pathological lead point for which surgical intervention is required. For idiopathic intussusception in smaller children between 6 months and five years non-operative reduction should first be attempted which may result in resolution of emergency. Such children at best should be managed in Pediatric centers which are specially dedicated to manage pediatric emergency. A decreased rate of operative intussusception management is noted in specialized paediatric hospitals compared with non-paediatric hospitals. This is attributed to the increased experience with and use of the various radiologic reduction techniques.^[14]

The management begins with immediate resuscitation with intra venous fluids to compensate for the fluid losses due to vomiting, dehydration and peritonitis. The patient should be exhibited antibiotics, kept nil by mouth and naso-gastric tube should be inserted to aspirate the gastric contents to prevent aspiration which might add to yet another respiratory emergency.

Attempt non operative reduction of intussusception provided gut perforation, peritonitis, gangrene and pathological lead point as the cause of intussusception has been excluded. Ileo-ileal intussusception is unlikely to respond to non-operative reduction of intussusception by therapeutic enema with patent ileo-caecal valve which prevents contents of enema to enter ileum. The medium chosen for therapeutic enema includes Barium or water-soluble contrast or air insufflation through ano-rectal route choosing a flexible soft non-injurious tube. A gentle abdominal manipulation by expert pediatric surgeon might help with concern to avoid perforation of intussusception after enema fluid has been given. The tube once gently inserted, precaution should be taken to press the buttocks so that enema fluid may not leak out defeating the very objective of retaining it. Enema fluid should be given 30 ml per kg. Alternately the patient can be given saline enema with gratifying results. A study by Flaum et al presented their experience in intussusception reductions using saline enema under ultrasound control and concluded that it is an efficient and safe procedure.^[15] The non-operative procedure should be undertaken under ultrasound or fluoroscopic imaging by experienced Radiologist in presence of Surgeon and the Paediatrician. Enema reduction is more likely to be

successful if initiated early (eg, within 4 hours of hospitalization).^[16]

The success rate of therapeutic enema in intussusception among children ranges up to 90 percent and depends upon the skill and experience of team and the duration and site of intussusception. The therapeutic non-operative reduction of intussusception is highly unlikely in long standing intussusception which has prolapsed. The manoeuvre for reduction with air insufflation the pressure should not exceed more than 120 cms of water and height of column of Barium contrast enema from buttocks should be 20 inches. The therapeutic Barium, water soluble contrast and air insufflation must be refluxed proximal to ileo-caecal junction for successful outcome. The therapeutic contrast can be prevented from entering into ileum because of local edema and competence of IC valve. According to this study, a patient who becomes asymptomatic after nonoperative reduction that fails to show reflux of the reducing agent into the ileum can safely be observed.^[17] The results of therapeutic enema are good if done timely, intussusception is of ileo-colic type and the presence of pathological lead point is excluded. After the resolution of intussusception by therapeutic enema, recurrence of intussusception may not be more than 5% to 10%. Risk of recurrence of the intussusception after operative reduction is less than 5%.^[18] Unresolved repeat enema may give good results due mainly to lessening of oedema and vascular congestion. Baby after success of therapeutic enema stops crying and goes into gentle sleep as the obstruction is relieved and spasmodic pain disappears and can be given oral feeds after 18 hours of observation and returned to home with the advice to parents to return for review.

Surgical intervention for intussusception

Surgical intervention to treat unrelenting intussusception must be resorted to without delay in face of failure of non-operative measures like therapeutic enema which should not be tried again and again after two attempts. Delay in resorting to surgery might compromise the safety of baby. There is absolute contraindication to persist with non-operative measures to manage intussusception which is getting complicated by peritonitis and deterioration of general condition with features of septicaemia taking over. We have three options to treat intussusception surgically depending upon the eligibility criteria to choose.

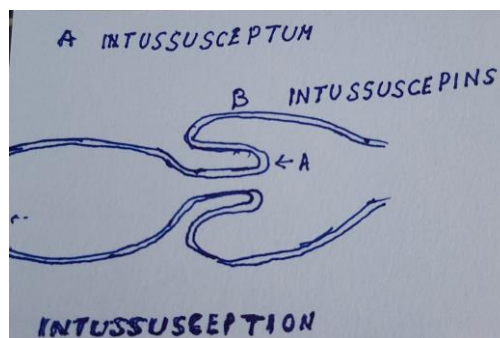
1. Laparoscopy has been added to the surgical armamentarium in the treatment of intussusception.^[19,20] Laparoscopic approach which is unsuitable in presence of onset of gangrene, peritonitis, friability of mass with likelihood of bleeding and perforation of the gut. Simple intussusception can be reduced easily by laparoscopic approach which is less invasive, inflicts less pain post operatively, gives faster post-operative recovery, confirms the reduction of intussusception and baby can

be started on oral feeds sooner than later and reduces post-operative stay in hospital.

2. The second approach to reduce intussusception should be followed when therapeutic Barium or contrast enema or air insufflation has failed and shows no progress of resolution. The patient should be subjected to laparotomy after resuscitation. The abdomen is opened by a supra-umbilical incision and sited over the palpable mass of intussusception. The mass of ileo-colic intussusception is palpable in supra umbilical region which is easily felt in relaxed abdomen under GA. The transverse abdominal incision in infants and children gives wide exposure to entire abdominal cavity and is most suitable. The

intussusception is generally accessible and intussusceptum is reduced and expressed out by gentle cautious pressure on intussusciens. No attempt should be made to pull out intussusceptum by traction lest the inflamed swollen mass perforates. Tolerant and patient attitude while reducing intussusception with moist gauze under finger manipulation is successful.

3. In case the intussusception has become gangrenous or perforates, resection of the gangrenous gut and anastomosis of healthy non-edematous gut is done to restore the continuity of gut by interrupted sutures. Excessive use of saline toileting should be avoided. Placing of the drain is safer.



CONCLUSION

In infants and small babies, it becomes difficult to ascertain the cause of their agony due to intussusception till the baby is brought to Pediatric Centre for examination and investigations. History of crying with

intervals of calmness and episode of loose motions and fever should arouse the suspicion of clinicians about the possibility of occurrence of intussusception. The baby is found to be flexing the lower limbs and clinical impression of intussusception is strengthened after a

lump becomes palpable during brief respite from spasmodic pain when the abdomen becomes temporarily soft. Therefore, colicky intestinal pain, feeling of palpable sausage shaped mass and passage of red-currant jelly like stools and empty right iliac fossa becomes suggestive of intussusception. Ultrasound and radiological investigations confirm the diagnosis. CT though a better diagnostic tool may not be favored because this investigation may delay the vital priority of immediate resuscitation and therapeutic intervention. Presence of target sign on ultrasound and presence of multiple gas and fluid levels in X- Ray leaves no doubt about the intestinal obstruction possibly due to intussusception. Delay in treating the baby may compromise the ultimate objective of saving the life of patient. Maximum of two trials for success of therapeutic enema should suffice but thereafter the failure to achieve the desired result the surgical team should intervene and perform laparotomy by transverse supraumbilical incision and try to reduce the intussusception manually by gentle pressure on intussusciense. In case the intussusception becomes gangrenous or perforates, resection and anastomosis must be done. Transverse incision for laparotomy among children gives wide access to abdominal and pelvic cavity. Final excellent outcome brings calm and gentle sleep to baby and the family.

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