ULTRASOUND GUIDED HYDROSTATIC REDUCTION OF INTUSSUSCEPTION IN CHILDREN WITH LATE PRESENTATION

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ABSTRACT

OBJECTIVE: To evaluate the successful management of intussusception through ultrasound guided hydrostatic reduction with respect to duration of symptoms in children up to 6 years of age.

METHODS: Retrospective analysis was done for 68 paediatric patients in the age range from 2.5 months to 6 years at Radiology & Paediatrics departments, Medical Teaching Institution Lady Reading Hospital, Peshawar. Children primarily diagnosed as intussusception, based on ultrasound findings & managed conservatively with ultrasound guided hydrostatic reduction from January 2014 to December 2017 were included in the study. Their management was analyzed with respect to duration of symptoms. Children who were primarily managed surgically were excluded from study.

RESULTS: A total of 68 patients in the age range from 2.5 months to 6 years were included in the study. Male to female ratio was 3.25:1 with 52 males (≤1 year=45 & >1 year=7) and 16 females (≤1 year=11 & >1 year=5). Abdominal pain was reported in all (100%) cases, followed by bleeding per rectum in 35.2% and abdominal mass in 13.2% cases. Classic triad of abdominal pain, abdominal mass and bleeding per rectum was reported only in 8.8% of cases. Overall rate of success of hydrostatic reduction was 89.70% (n=61/68). Success rate in cases presented ≤48 hours was 97.56% and in cases presented >48 hours was 77.77% (p<0.05).

CONCLUSION: Hydrostatic reduction for intussusception in paediatric patients under ultrasound guidance has a good outcome. Success rate for patients presenting presented ≤48 hours was better than patients presenting presented >48 hours.

KEY WORDS: Intussusception (MeSH); Hydrostatic reduction (Non-MeSH); Ileocolic intussusception (Non-MeSH); Child, Preschool (MeSH); Child (MeSH); Infant (MeSH); Ultrasonography (MeSH).

THIS ARTICLE MAY BE CITED AS: Ullah N, Irshad M, Ullah I, Khan MI, Hayat M, Hussain M. Ultrasound guided hydrostatic reduction of intussusceptions in children with late presentation. Khyber Med Univ J 2019;11(1):37-40. DOI:10.35845/kmuj.2019.18747.
**METHODS**

This retrospective study was conducted at Department of Radiology in collaboration with Department of Paediatrics, Medical Teaching Institute Lady Reading Hospital, Peshawar from January 2014 to December 2017. All children admitted with diagnosis of intussusception were included. Paper record of children who had undergone hydrostatic reduction was accessed after permission of ethical committee of hospital. All cases with complete record were included. Cases with probable diagnosis were excluded. Data of age, gender, presenting symptoms, duration of symptoms, procedure performed and its outcome were recorded.

Children admitted with probable

diagnosis of intussusception were admitted to paediatric ward. Abdominal X-ray was done to exclude gut perforation. Ultrasound was done to confirm diagnosis. Ultrasound findings of “target sign” on axial scan and “sleeve sign” on longitudinal scan were taken as diagnostic. Other sonographic findings recorded were diameter of intussusceptum, free fluid in abdominal cavity, presence of ischaemia on doppler ultrasound and presence of lead point. Children with septic shock and unstable hemodynamic parameters were directly referred to Paediatric Surgery and were excluded from study.

Intravenous fluids were given. Serum electrolytes were corrected if required. Nasogastric tube was passed to avoid aspiration during procedure as bowel distension can lead to vomiting. Hydrostatic reduction was performed. Children with stable hemodynamic parameters were continuously monitored clinically and with ultrasound. If vital signs were found to be deteriorating or HR failed, children were referred for surgery. Repeat HR was done where indicated.

Children were shifted to ultrasound room. In the presence of parents, child was put in supine position. Foley’s catheter of size 22-24 Fr was passed per rectal and balloon was inflated with 40 to 60 ml of normal saline to avoid leak. 1.5 litre of normal saline at 37°C was connected to Foley’s catheter and suspended above couch level to maintain flow under pressure. Child was continuously monitored with ultrasound for retrograde movements of intussusception. Failure of retrograde movements of intussusception was considered failure. Maximum of three attempts were done before declaring failure of HR and children were shifted for surgery.

After successful reduction children were given intravenous fluids and antibiotics and kept nil per oral for 24 hours. Pre-procedure, all children received paracetamol and intravenous midazolam for analgesia and sedation respectively. Data were analysed in Microsoft Excel and presented in tabulated forms.

**RESULTS**

Sixty-eight patients were primarily treated with hydrostatic reduction out of which 61 (89.7%) were successfully reduced with HR and seven (10.3%) failed cases were shifted for surgery. Male to female ratio was 3.25:1 with 52 males (≤1 year = 45 & > 1 year = 7) and 16 females (≤1 year = 11 & > 1 year = 5). Mean age was 13.1 months with 12.6 months for male children and 14.8 months for females. Abdominal pain was reported by all cases, followed by bleeding per rectum and abdominal mass. Classic triade of abdominal pain, abdominal mass and bleeding per rectum was reported by a minority of patients as shown in Table I. Majority of children were 1 year old or younger. One third of the children presented with symptoms for 24 hours or less. Out of delayed presenters 29.41% presented later than 48 hours. In majority of cases, cause could not be found. Ultrasound confirmed diagnosis in all cases. In minority of cases, causes that were identified were Meckel’s diverticulum, mesenteric adenitis and gut gangrene. Nine out of each ten intussusception cases were successfully reduced with hydrostatic reduction. Cases (07/68; 10.29%), which could not be reduced with hydrostatic reduction were shifted for surgery.

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**TABLE I: CLINICAL PRESENTATION OF INTUSSUSCEPTION**

| Clinical Feature                  | Frequency (n=68) | Percentage |
|-----------------------------------|------------------|------------|
| Abdominal Pain                    | 68               | 100        |
| Per Rectal Bleeding               | 24               | 35.2       |
| Abdominal Mass                    | 09               | 13.2       |
| Vomiting                          | 08               | 11.7       |
| Diarrhoea                         | 05               | 7.3        |
| Triade of Pain, Mass and Rectal Bleeding | 06            | 8.8        |
| Onset of Symptoms <24 hours       | 23               | 33.82      |
| Onset of Symptoms >24 hours       | 45               | 66.17      |
| Cause of Intussusception Found    | 05               | 7.36       |
| Idiopathic                        | 63               | 92.64      |

**TABLE II: DURATION OF SYMPTOMS AND HYDROSTATIC REDUCTION SUCCESS**

| Outcome of Hydrostatic Reduction | Duration of symptoms | Total | p-value (Fisher's exact test) |
|----------------------------------|----------------------|-------|-----------------------------|
| Successful                       | ≤48 hours            | 40 (97.56%) | 61 (89.70%) | 0.0134 |
| Failed                           | >48 hours            | 01 (2.4 %) | 06 (22.22%) |
| Total                            |                      | 41     | 68                           |
Majority of those cases shifted for surgery had presented with symptoms for more than 48 hours. Only one death was reported. Success rate of HR with respect to the duration of symptoms was analyzed by Fisher's exact test. At p-value of 0.0134 two tailed, our results were significant as per results in Table II.

**DISCUSSION**

In this study on 68 patients, male patients were predominant. Majority presented with abdominal pain, bleeding per rectum and abdominal mass. Overall rate of success of hydrostatic reduction was 89.70%. Success rate in cases presented ≤48 hours was better than cases presented >48 hours.

Intussusception is among the common causes of intestinal obstruction in children. In our study 76.5% patients were males. These findings are consistent with findings of Imran M et al showing 69.7% male patients. Male predominance is recognized and reported per literature.15,18

Almost 90% of cases are reported to have an unknown cause. As per our data, in 92.64% of cases, no lead point was identified. In the rest of cases, a lead point in the form of Meckel’s diverticulum, mesenteric adenitis and bowel wall oedema was identified. Diagnosis is usually delayed because of nonspecific symptoms as presenting feature instead of classic symptoms. The classic features of intussusception abdominal pain, abdominal mass and bleeding per rectum are reported by minority (8.8%) of patients in our study. It commonly presents as abdominal pain, bleeding per rectum, vomiting, abdominal mass and diarrhoea.17,18,19

In the absence of classic symptoms threshold for diagnosis should be kept low in those children presenting with any of the above symptoms alone. High vigilance is particularly required for children below two years of age and diagnosis should be confirmed with ultrasound.20

Ultrasound has high sensitivity and specificity for diagnosis of intussusception, reported 100% in our study.21 Air and contrast enema has been used for diagnosis and reduction but there is high risk of radiation and perforation. Hydrostatic reduction under ultrasound monitoring is a safe way of reducing intussusception with no risk of radiation.22

Overall success rate in our study was 89.70%. Imran M, et al. reported success rate of 81.81 % for non-surgical intervention.23 Hasnain MA, et al. had almost similar results, reporting 85.7% success rate of hydrostatic reduction of intussusception in children.24 Some studies have reported that HR is less successful when duration of symptoms is more than 48 hours. Delayed presentation has been reported to have high risk of perforation.25 Our study demonstrated success rate of 77.77% in patients presenting with symptoms for more than 48 hours. Likelihood of success of hydrostatic reduction is not less in those presenting later than 48 hours. Hasnain MA, et al showed success rate reduced to 72.8% in cases presenting in more than 48 hours duration as compared to 100% in cases presenting within 48 hours of duration. This fact is also demonstrated as 75% by other studies.26

**CONCLUSION**

Our study provides a good evidence for success of hydrostatic reduction under ultrasound guidance in paediatric patients presenting with intussusception. Success rate for patients presenting presented ≤48 hours was better than patients presenting presented ≥ 48 hours.

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