

Ultrasound Value in the Diagnosis of Intussusception

Ahmed Zubar Zain*, Nael A. Hussein **

ABSTRACT:

BACKGROUND:

Intussusception is an invagination of one portion of the intestine into the lumen of an immediately adjoining part.

OBJECTIVE:

To evaluate the sensitivity and specificity of ultrasound in the diagnosis of intussusception.

PATIENTS AND METHODS:

This is a prospective study of 50 cases of intussusception in the Central Child's Teaching Hospital in the period between April 2008 and February 2010.

forty five patients (90%) were below 6 months and five patients (10%) were above 6 months

Male patients predominated and the male to female ratio was (1.2:1).

Seasonal variation was seen in primary intussusception (i.e. in age group of 6 to 24 months old) with peak incidence in spring and summer.

Abdominal pain and vomiting were the most common symptoms in intussusception (92% and 88% respectively), followed by bleeding per rectum (76%), abdominal mass was found in 66% and constipation was found in 28%.

RESULTS:

The diagnostic tool used was the ultrasound for fifty patients; in forty five cases, diagnosis was made by a characteristic ultrasonic findings of intussusception (i.e. target sign or pseudokidney sign), forty three patients of the group had a classical intussusceptions' mass during operative procedure, the rest (i.e. 2) had negative operative findings for intussusception.

5 of the patients, the ultrasonic findings were negative for intussusception preoperatively (no mass), but during surgery we found an intussusception mass.

CONCLUSION:

So ultrasound study in our hospital gives us sensitivity of 95.5% to diagnose intussusception.

KEYWORDS: Intussusception, ultrasound of abdomen, bleeding per rectum.

INTRODUCTION:

Intussusception is an invagination of one portion of the intestine into the lumen of an immediately adjoining part. This disease has a long and fascinating medical history. It has been recognized for three centuries. It was firstly described by Poul Babette of Amsterdam in 1674 and suggested operative reduction. John Hunter described intussusception accurately and discussed a post-mortem specimen^(4,5).

Intussusception occurs in 1 / 250-1000 infants and children. All series report a strong male preponderance, usually in the order 3:2; this preponderance is more striking in the 6-9 months age group⁽¹⁾. It is slightly more common in white

than in black children. In US there is no significant difference^(5,10).

It can occur at any age, however, the greatest incidence occurs in infants between 5-10 months of age, more than half of all cases occur within the 1st year of life and only 10-25% of cases occur after the age of 2 years^(11,14). Diagnosis of intussusception can be done by the following:

1. Plain film may show an abdominal mass, abnormal distribution of gas and fecal contents, sparse large bowel gas and air-fluid level in the presence of bowel obstruction.

2. Barium enema: was firstly used to diagnose an intussusception by William Ladd in 1913, currently a controlled barium enema is the most reliable diagnostic technique for an ilioocolic intussusception.

* University-College of Medicine
Pediatric Surgeon Lecturer in Al- Nahrain.

**Pediatric Surgeon-Central Teaching Hospital
of Pediatrics Baghdad-Iraq.

ULTRASOUND IN DIAGNOSIS OF INTUSSUSCEPTION

Two signs are diagnostic: a coiled spring sign and claw sign (the barium in the intussusception is seen as a claw around the negative shadow of the intussusception)^(15,18)

3-Abdominal ultrasonography: has become the standard non-invasive diagnostic technique and is very reliable in experienced hands

The child is examined in supine position and generally there is no specific preparation needed. Using a high frequency curvilinear probe, a careful initial preliminary examination of the whole abdomen should be performed. Attention should be focused on looking for a segment of solid-looking bowel which is non-peristaltic. Once the mass has been identified then the sonograph should be changed to linear probe. Typical alteration Hypo- and Hyper echoic bands of mucosa and muscles can be seen. This has been described as the target Hamburger or Doughnut appearance in cross section and as a Pseudokidney in longitudinal section.^(19,22)

Doppler examination should be used to evaluate the vascularity of the intussusception as a poor vascularity be ends with infarction of the bowel. In addition, the presence of free fluid trapped between the colon and intussusception has been shown in several studies to be associated with ischemia of the bowel. Intussusceptions are recognized to be intermittent, so that may appear and disappear during the examination^(23,24)

AIMS OF STUDY:

1. To find a non invasive way to confirm the diagnosis of intussusception.

2. To determine the accuracy of ultrasound in diagnosis of intussusception.

3. Setting ultrasound a reliable investigation will significantly decrease the diagnostic hazards (radiological hazards) , so we try in this study to determine the roof of reliability of ultrasound in diagnosing intussusception.

PATIENTS AND METHODS:

A prospective study of 50 cases with intussusception was done in the Central Childs Teaching Hospital in Baghdad, from April 2008 to February 2010. We select the cases that the diagnosis of intussusception was done by Ultrasound in our hospital and by the same doctor and same machine. Selected cases in which the diagnosis of intussusception was done either by Ultrasound or by clinical examination supported by Ultrasound study. Ultrasound study had been performed in all the included cases in this study . Cases which had been operated at night as urgent cases are not involved in this study.

It includes:

1- Infants younger than 6 months' age.

2- Infants older than 6 months' age.

It also includes the presenting symptoms, seasonal distribution, type of presentation and the most common lead points encountered.

RESULTS:

1. Age incidence:

During 21 months period, 50 cases of intussusception were collected and divided into 2 groups as shown in this table

Age	Number	Percentage
< 6 months	45	90%
> 6 months	5	10 %
Total	50	100%

2. Sex distribution:

It is as shown with the age in the table below

Age group	Female	Percentage	Male	Percentage
< 6 months	19	42.22%	26	57.78%
> 6 months	4	80%	1	20%
Total	23	46%	27	54%

Male to female ratio in age group less than 9 months was 1.4:1

ULTRASOUND IN DIAGNOSIS OF INTUSSUSCEPTION

3. Symptoms & Signs:

The most common presentation of our patients was abdominal pain 92% followed by bile stained vomiting which account for 40% as shown in the table below.

Symptom or sign	No. of patients with primary intussusception	Percent
Abdominal pain	46	92%
Vomiting	44	88%
Abdominal mass	33	66%
Bleeding per rectum	38	76%
Constipation	14	28%

4. Ultrasound value in Diagnosing intussusception :

Surgical Findings	U/S +ve	Percent	U/S -ve	Percent
+ve laparotomy	43	95.5%	5	100%
-ve laparotomy	2	4.5%	0	0%
Total	45	100%	5	100%

In our study, the two negative laparotomy of intussusception were diagnosed by ultrasound as intussusception, the findings during operation were Appendicular mass and duplication of

bowel, although appendicular mass has its own features by abdominal ultrasound. Spontaneous reduction of intussusception is possible in 2.5%.

5. Types of lead points:

The most common lead point was Meckl's diverticulum as shown in this table.

Lead point	<6 months	6months-2 years	2 – 14 years	percentage
Meckel's diverticulum		1	2	6%
Polyps			2	4%
Volvulus	1	1		4%
Duplication of bowel		1		2%

DISCUSSION:

Intussusception is the most common cause of bowel obstruction in early childhood, with the peak incidence between 6 months and 9 months of age. It is typically presented with an acute onset of colicky abdominal pain, however, when the bowel obstruction is not complete, the clinical symptoms can be confusing with the recurring non-specific abdominal symptoms. The apex of the intussusceptum is the part most prone to the development of pathologic changes.

In this study, we focused on the value of ultrasound in diagnosing intussusception regardless the causes of intussusception whether primary or secondary or the association with lead points or not. It is a quick, simple, noninvasive method to diagnose intussusception, with high accuracy. The age of presentation was divided into 2 age groups, 45 patients (90%) were below 6 months of age, and 5 patients (10%) were older than 6 months. This is similar to the findings of previous study by D.G. Young¹⁶, Magnete ED⁽¹⁷⁾

We chose only one method for diagnosis which was Ultrasound, so all the cases were submitted to ultrasound examination before going to theater for operation. In this series all 45 cases were diagnosed as intussusception by ultrasound (90%), only 2 of these were having negative laparotomy for intussusception (no mass). These 2 were revealed as appendicular mass and duplication of the bowel. 5 cases were diagnosed as intussusception clinically with negative ultrasound findings; operations were done revealing intussusception mass and reduced successfully. This gives sensitivity of 95.5% to the ultrasound to be a diagnostic tool for intussusception in our hospital.

This is not coincide with results done by Lewis Spitz & Arnold G. Coran with a sensitivity of 98%-100%⁽²⁵⁾

Intussusception can begin in any free-moving part of the bowel; however, the ileocolic intussusception is the most common, with the

ULTRASOUND IN DIAGNOSIS OF INTUSSUSCEPTION

ileum being telescoped through ileocecal valve into the cecum.

The common type of intussusception depending on operative findings was ilio-colic in 36 cases (72%), ileo-ileal 9 cases (18%), colo-colic 3 cases (6%) and ileo-ileo-colic 2 cases (4%). Most cases of intussusception are idiopathic, with no identifiable lesion acting as the lead point. Rarely, a mechanical lead point, such as intestinal polyp, Meckel's diverticulum, duplication cyst or lymphoma, can be found.

The most common specific lead point causing intussusception in our study was Meckel's diverticulum were found in 3 cases distributed as 1 case in the age between 6- 24 months and the other cases in more than 2 years. The other common lead point was polyps in age group of more than 2 years was found in 2 cases (4%), one of them was having multiple polyps along the large bowel and presented as acute abdomen with delayed presentation and the patient died immediately after operation. The other sporadic cases was due to volvulus 2 cases (4%) and duplication of the bowel 1 case (2%). These results were similar to study done by Bhisitkul et al⁽²⁵⁾.

CONCLUSION:

- 1- The diagnosis tools we used in this study was the ultrasound and gives us a sensitivity of 95.5% to diagnose intussusceptions mass.
- 2- Any clinical presentation beyond the typical age group (i.e. 4-9 months) raise the possibility of secondary lead point (i.e. secondary intussusceptions).
- 3- In secondary intussusceptions, resection of pathological lead point is needed mainly because of the pathological lesion (which could lead to recurrent intussusception if you leave it) and not because the gangrenous bowel.

Recommendation

- 1- The physicians and surgeons have to keep in mind the possibility of intussusception in children with classical triad of bilious vomiting, screaming attack and bloody diarrhea.
- 2- The diagnosis of intussusceptions is made by ultrasound, so every patient with abdominal pain and bloody diarrhea should be sent for ultrasound as the sensitivity of ultrasound reaches 95.5% and more in expert hands.

REFERENCES:

1. James A.O.neill Jr. : intussusception , pediatric surgery , 1998 ;2:1182-85.

2. John G. Raffens perger , MD ,Swenson ' s pediatric surgery , 5th edition ,1990 :221-229 ,402
3. Keith W. Ashcraft, J. Patrick Murphy , Ronald J. sharp , David L. Sigalet and Charles L. Snyder : Intussusception , pediatric surgery , 4th edition ,2004 : 533 - 42.
4. Mark M.Ravich , Kenneth J. Welch, Clifford D. Benson , Eoin Aberdeen and Judson G. Randolph : Intussusception , 3rd edition , 1984 ; 3 :989.
5. Charles V. Mann, R.C.G , Russell and Norman S. Williams : Baily and love 's short practice of surgery , 22nd Edition , 1995: 800,18.
6. B.LRees & J.Lari : chronic intussusception in children, Br.J. surg. 1976; 63: 33 .
7. Robert Strang, intussusception in infancy & children , a review of 400 cases , B.J.S. , 1994 ; 46.
8. Mc Dermott- VG , Taylor - T , Mackenzie-S & Hendry -GM. ,pneumatic reduction of intussusception : clinical experience & factors affecting outcome . Clin.- radiol. , 1994; 49:30 .
9. Low. V.H. , Paulson E.K. : cystic fibrosis with colonic intussusception, AJR. AM. J.Roentd , vol. 165 , no. 1 , 1995:196 (abstract) .
10. Claudio de Lorenzi & Donald G. Marshall ;Jejunal intussusception: A case report & review. Journal of paediatric surgery., 1988;23 :374.
11. Jequir , S. , Argyropolon . M & Bugmann ,P. :ultrasonography of jejunal intussusception in children, Can - Assoc. Radio. J. 1995;46:285.
12. Lewis Spitz & Arnold G. Coran ,rob & Smith's operative surgery, pediatric surg. ,6th. Edition, 2006 :445-46 .
13. Lazar J. Green field, Michael W. Mulholland, Keith T. Oldham, et al : intussusception in scientific principles and practice, 2nd. Edition, 1997:2067.
14. Ong N. , Beasleg SW: the lead point in intussusception . J. Pediat. Surg. 1990;25:640-43 .
15. paediatric ultrasound ,How , Why & When Rose de Bruyn 1st edition 2005.
16. IF. Hutchison, B. Olaywola & D.G.Young. Intussusception in infancy & children. Br. J. surg. 1980; 67:209.

ULTRASOUND IN DIAGNOSIS OF INTUSSUSCEPTION

17. Magnete - ED , & Allison - AB . Intussusception in infancy & childhood: an analysis of 69 cases. West Afr. J.-med., 1994; 13:87(abstract).
18. J.T.Momoh , intussusception in infants & older children : a comparison, pediatric unit, Ahmadu Bello unv. Hospital, Zaria, Nigeria, Annals of tropical pediatrics, 1987;7:118-21, printed in Great Britain.
19. Sigmund H. Ein , leading points in childhood, journal of pediatric surgery, 1997; 11.
20. You-Sahkim ,M.D. , & Jong - Hwan Rhu , M.D. , intussusception in infancy & childhood. Analysis of 385 cases. Int. surg. 1989; 74:114.
21. Chang-ML , Cheung. W , Ling .YK, and Chin.WW . Chronic intussusception in children. Acta, paediatric - Sin, 1994;35:335 (abstract).
22. Akram J. Jawad , Sabah Y. Shibli, ;Prem S. Sahni , MBBS .MD ; and Tajuddin Malabarey , FRCS . Chronic intussusception. Annals of Saudi Medicine,1997;17:545.
23. J.A.M.Reijnen , C. festen and H.J.M. Joosten. Chronic intussusception in children. Br. J. surg . 1989; 76: 815 .
24. Lewis Spitz & Arnold G. Coran , Ultrasound in diagnosis of intussusception , operative pediatric surgery , Sixth edition 2006:446.
25. Bhisitkul, D.M., R. Listerick, A. Shkolnik, J.S. Donaldson and B.D. Henricks et al., Clinical application of ultrasonography in the diagnosis of intussusception. J. Pediatr.,1992; 121:182-86.